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MECCANO MAGAZINE

THE QUARTETTE !

6d.

Next Month: "BOMBERS OF THE RED AIR FORCE." By J. W. R. Taylor

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With the Editor

British Post-War Civil Aircraft

I recently received a letter from a reader who has seen in the press a great deal about new American air-liners, but very little about British post-war civil aircraft. He wonders if this means that we are being left behind in the struggle for a share in the world's airlines.

Fortunately things are not nearly as bad as they seem. There is no doubt that some American aircraft receive more than their fair share of publicity. This is not altogether the fault of the Americans, although some of their companies are inclined to be over-enthusiastic about their aircraft. Much of the trouble is due to our notorious British modesty about home products, and the fact that so few of our companies are publicity-minded.

It is clear that we must put our goods into the international shop-window if we are to give our aircraft a square deal in the world market. And what a fine show of new aircraft we have.

The Avro "Tudor" 1 and Vickers "Viking" prototypes are already flying. Both are fine large air-liners, designed and built by the manufacturers who gave us the "Lancasters," "Spitfires" and "Wellingtons." Later this year the first "Tudor" II will be completed and should set a new standard for civil transports, its pressurised cabin accommodating 50 passengers in comfort. In the same class is the Handley-Page "Hermes," developed from the "Halifax" bomber and built by a company whose experience in the construction of air-liners is second to none.

In the "very large" category is the 150-seat Bristol 167 "Brabazon." It will not fly for some time yet, but will be worth waiting for as it will incorporate all the latest ideas. Meanwhile numbers of Short "Shetland" flying-boats are being built. There is little need to praise this aircraft—the reputation of Short flying-boats is world-wide and the "Shetland" merely carries on where the Empire and "Sunderland" flying-boats left off.

The new Miles M-56 and M-60 and the de Havilland "Dove" were described last month. These aircraft cater for feeder-line operators, ensuring that there is a British-built air-liner for every job.

We have every reason to be proud of our achievements in the last six years. The only Allied jet-propelled aircraft in action at the moment is British; our bomb- and gun-sights are so good that the Americans use them in preference to their own. In fact almost all the outstanding inventions of the air war, including rocket projectiles and, most important of all, radar, are solely the results of British research and manufacturing genius.

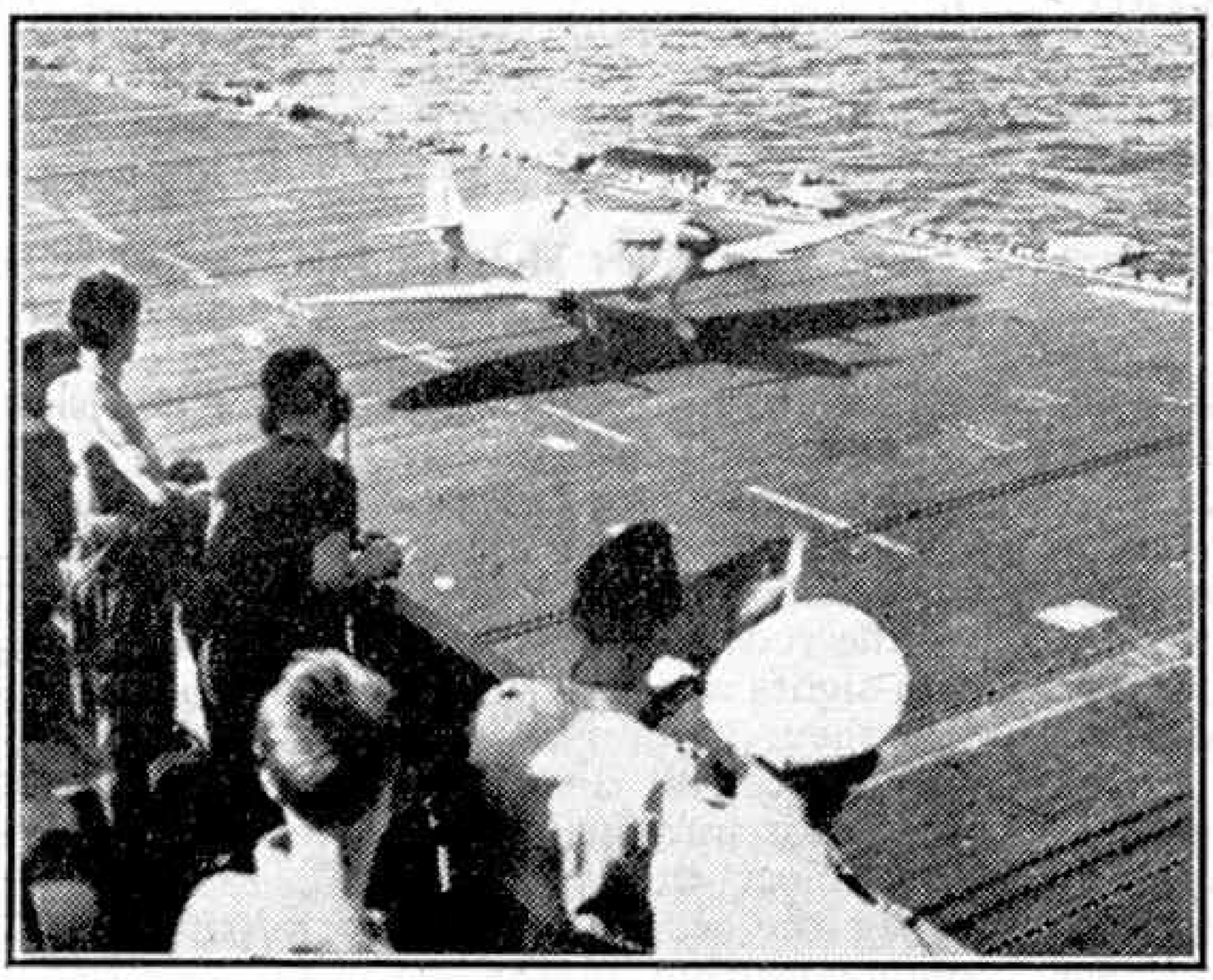
Until the new air-liners are available in large numbers we have the "York" and "Lancastrian," the "Warwick," "Halifax" transport and "Sunderlands" to fill the gap. They are as good as any comparable aircraft in the world.

This Month's Special Articles

Aircraft versus Seacraft

By C. G. Grey

NOW that all of the offensive work for aircraft in Germany is over and only peace-flying of Very Important Persons and prisoners of war remains, we may reasonably consider what the aircraft of the British Empire will have to do in the Pacific war, and what aircraft of the U.S. Army and Navy have already done. Possibly there will be something for the R.A.F. and for the U.S. Army Air Corps to do on the Continent in chasing small bands of "last-ditchers" or wanted criminals from one hide-out to another. But that is another story.



Escort Carrier H.M.S. "Battler." A "Seafire" takes off.

The really big task is the complete smashing of the Japanese nation. And a good deal of that smashing will have to be done from the sea, even if we can get bases on the Chinese mainland and if the Russians allow us to use our aircraft from the soil of any of the Soviet Republics which are within reach of Japan—which is not at all likely.

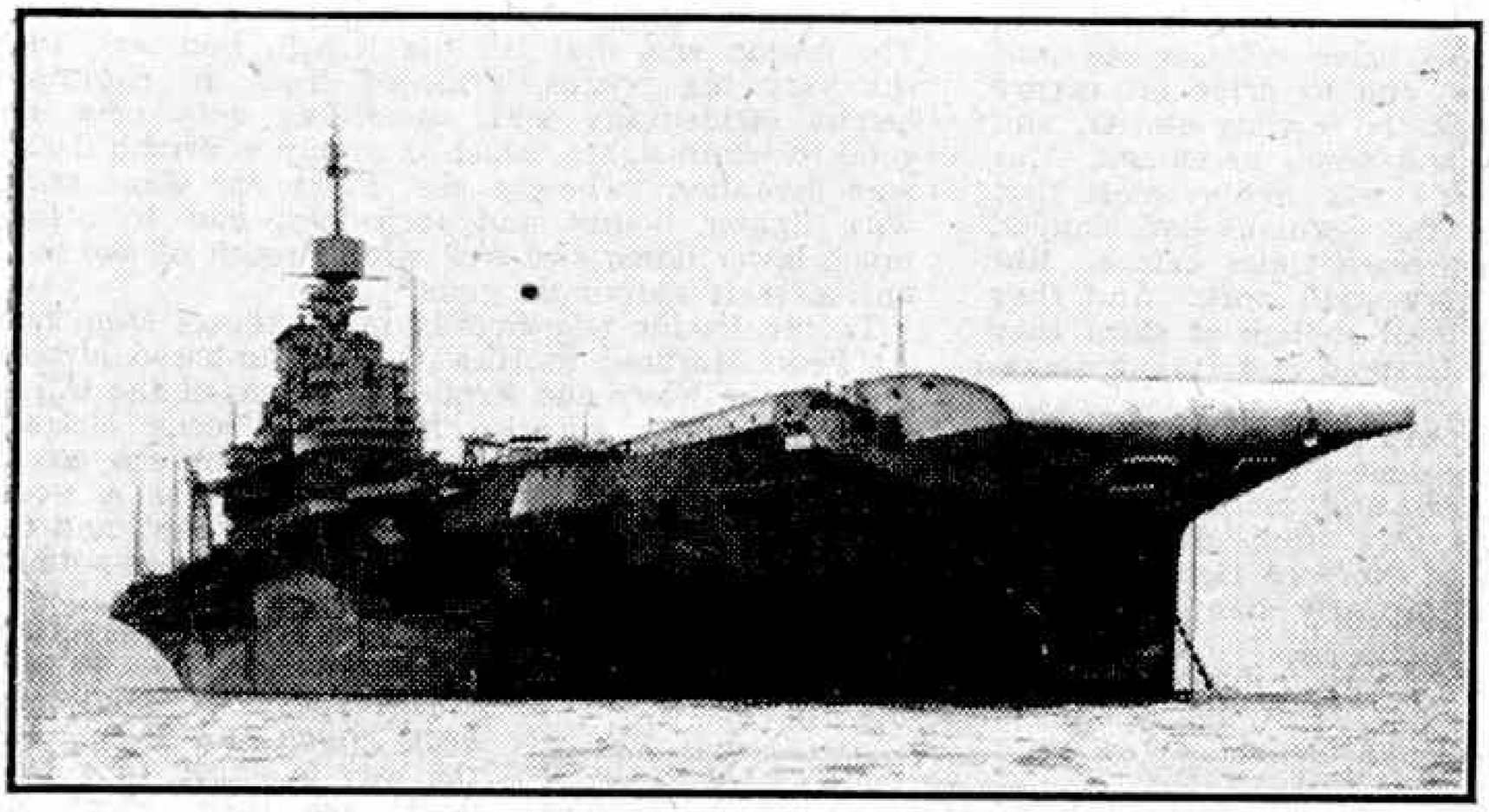
For a long time there has been a theory that seacraft, all the way from the biggest battleships or largest aircraft-carriers, or "flat-tops" as the U.S. Navy calls them, down to the smallest transport-tramps, destroyers, frigates or corvettes, must necessarily be at the mercy of any well handled and well equipped force of land-planes. The general idea was that aircraft which could take off from land bases would, up to the limit of their range of action, which naturally depends on their supply of fuel, have an advantage over either (*a*) anti-aircraft guns on warships, or (*b*) aircraft catapulted from warships, or which took off from the flying decks of aircraft-carriers.

Obviously land-based bombers must have an advantage over bombers flying off carriers, simply because on a land aerodrome runways much longer than the deck of any aircraft-carrier are possible. Consequently bigger aircraft can be used, and they can carry much heavier loads, per square foot of wing, than anything that can get off a carrier. Carrier-borne aircraft also have the disadvantage that to get them down the lifts from the flying-deck to the hangars on the lower deck the designers have to make their wings fold up, and folding wings must have hinges and locking devices and such things, which add to the weight of the whole machine. Which means that either deck-flying aircraft have to carry less fuel and so must have a shorter range than shore-based aircraft, or that they must carry a lighter weight of ammunition or bombs, apart from the fact that carrier-borne aircraft must necessarily be much smaller than shore-based aircraft.

The only argument on the other side is that carrier-borne fighters are necessarily defensive, and so can afford to carry less fuel as they have not to go so far to meet the enemy as have land-based fighters which are escorting bombers.

Another point to be considered is that the contrast or comparison between shore-based and carrier-borne aircraft varies a bit according to whether the shore-based machines are going a long way out to sea to find the hostile fleet, or whether the hostile fleet dares to come in-shore to make use of the greatest weight of bombs or of fire-power which its aircraft can carry.

Our Royal Navy and the U.S. Navy have both learned a lot of lessons in this war. I can only hope that they will transmit them to future generations who may profit by them when we have an-



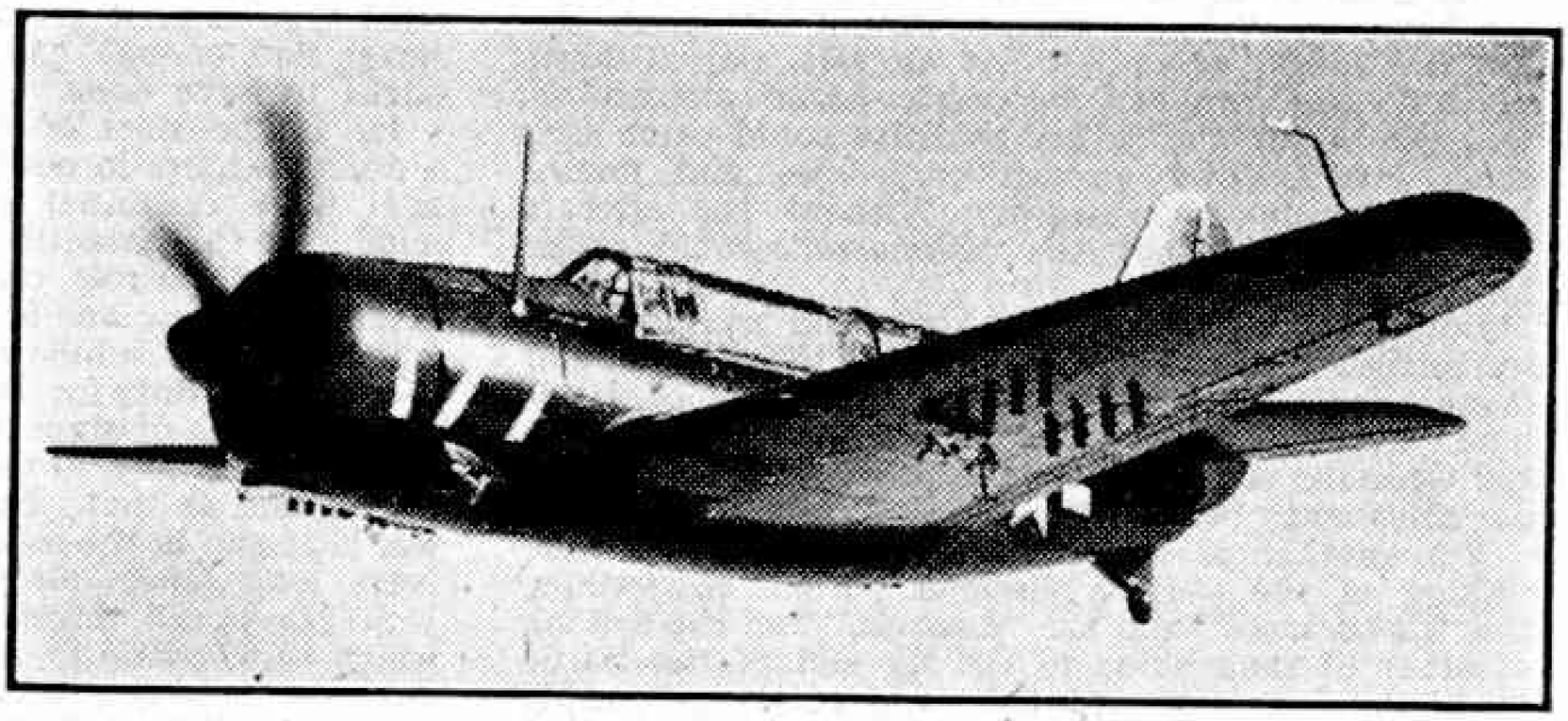
The British aircraft carrier H.M.S. "Illustrious."

other war. For do not let us deceive ourselves with the idea that any possible League of Nations will assure the peace of the world by agreement. All history teaches us that no nation has ever kept a treaty or an agreement for a day after that treaty has ceased to pay.

Early in the war we lost two of our biggest carriers, the *"Glorious"* and the *"Courageous."* One was torpedoed out in the Atlantic with considerable loss of lives, and the other was discovered, with its attendant destroyers, in a fog off the coast of Norway, and was sunk by the gunfire of more powerful German ships while the weather was such that the carrier-borne aircraft could not operate.

For a long time our Navy did not understand that carrier ships must operate on the same principle as land aerodromes. That is to say, if an aerodrome which is within reach of the enemy's bombers is to be used as the base from which to attack enemy territory, or to defend its own, that aerodrome must itself be covered and defended by fighters from an aerodrome far enough behind it to be reasonably free from attack by enemy bombers. For example, in the Battle of Britain in 1940, all our aerodromes along the South Coast were so badly bombed by the Germans that they were uninhabitable. But the R.A.F. still used them as landing grounds for damaged fighters and as refuelling points. And while they were being so used they were protected against more bombing by fighters from aerodromes 25 mile or more behind them, which aerodromes the Germans could not reach because the intervening air was well covered by fighters.

At the time of the battle for Crete the Navy sent in one of our newest and best carriers, the *"Illustrious,"* all alone in the hope of damaging the German attackers. The ship was badly smashed, but, as she was as near being an unsinkable ship as could be, she managed to get back to Gibraltar under her own power and thence, after being patched up, across the Atlantic, where she was practically rebuilt. If there had been half a dozen, or better still a dozen, carriers in the Mediterranean at the time, fighters from the forward line of, say, three carriers, could have driven the Germans out of the air, while their ships were protected against high-flying bombers by fighters from the ships farther out at sea.



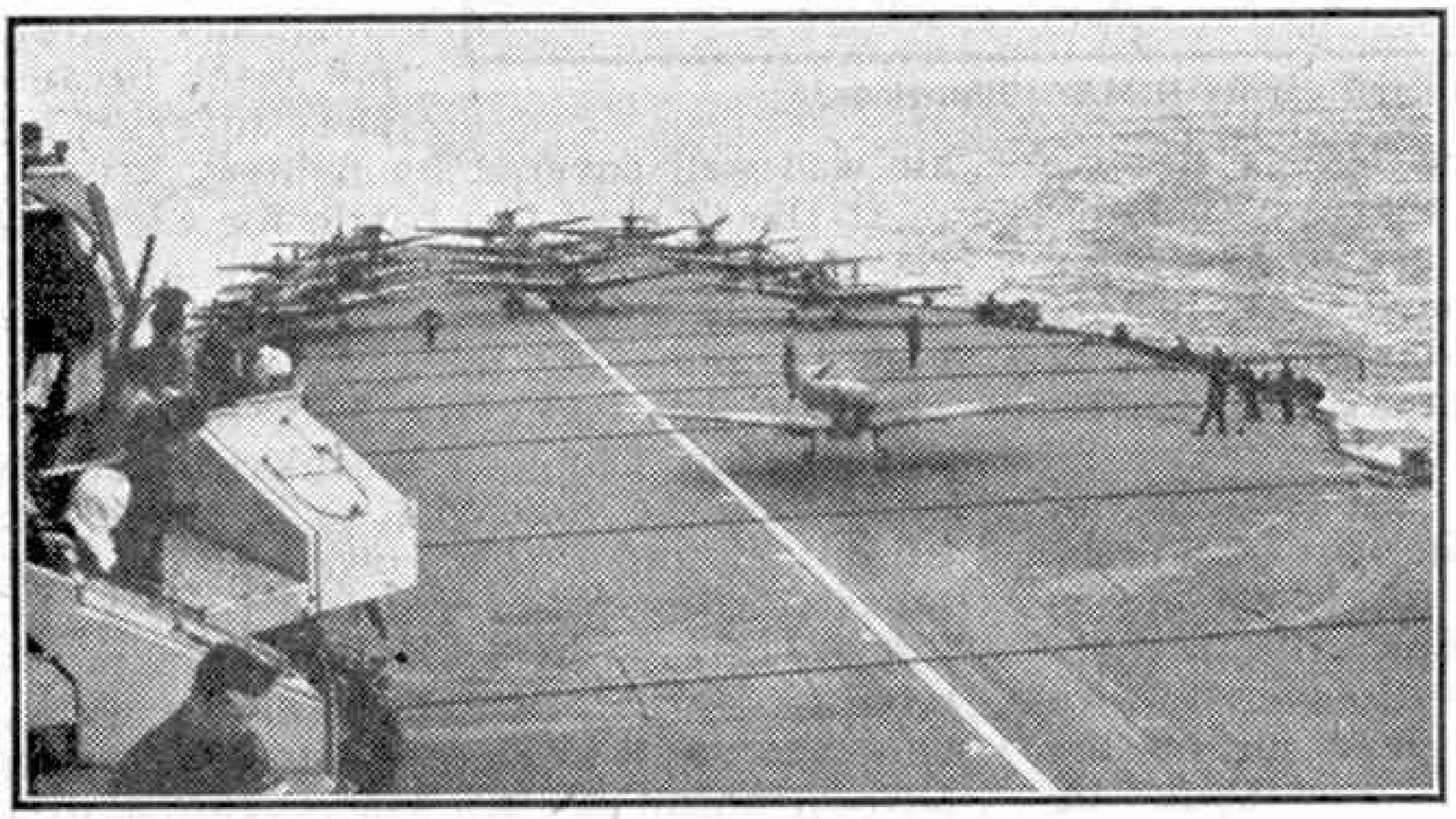
The latest Curtiss "Helldiver" dive-bomber, in service with the U.S. Navy in the South Pacific. Photograph by courtesy of the Curtiss-Wright Corporation, U.S.A

The first senior Naval Officer to appreciate that fact was Admiral Lister when he commanded that great convoy which saved Malta by supplying it with food and armament when the defenders of the island were pretty well down to

what one might call the bottom of the barrel. He took three carriers, one to drive off German and Italian attackers of Malta, one to drive off enemy aircraft which might attack the leading carrier, and the other one to act as and when necessary. Unfortunately H.M.S. "*Eagle*" was really sunk that time (by a torpedo), after the Germans had claimed to have sunk her at least three times before. But the other two ships did very good work. And they proved that if there had been enough of them they could have driven off the German and Italian shore-based aircraft.

The work which the torpedo bombers and bombers of the Fleet Air Arm have done during the past two years against German aircraft and, more particularly, German shipping, all the way from Murmansk in Russia round the north of Norway right down to France, has shown what properly handled carrier-borne aircraft can do.

Some hideous mistakes have been made, and a lot of valuable lives have been lost, through refusal to accept new ideas and through delay in learning lessons—but we have learned.



"Spitfire" taking off from an aircraft carrier's deck, with other machines warming up behind.

One of the finest examples of the uses of carrier-borne aircraft against seacraft was the sinking of the "*Bismarck*," which was shadowed all across the North Atlantic by shore-based aircraft, slowed down by torpedoes dropped by carrier-borne aircraft, so that our bigger and slower warships could catch her, again attacked by aircraft torpedoes, and finally sunk by ordinary warships. Without the aircraft the chances are that the "*Bismarck*" would never have been caught.

But at the tail end of that action our warships had to retreat hurriedly because the "*Bismarck*" had managed to steam just within the range of land-based German aircraft, although still so far out that the Germans could not send enough aircraft to drive our ships away before they had sunk her.

Yet another phase of this question has been the sinking of the various German pocket battleships, the "*Deutschland*" and the "*Luetzow*," and the driving of other of their ships to the far end of the Baltic (until the Russians captured those ports) by our big bombers from bases in England. But in those operations we had the advantage that the German shore-based fighters had been so hammered by the R.A.F. and the U.S. fighters that they could not put up much of a fight against the bombers. And considering that in the later operations the R.A.F. was using the 20,000 lb. (practically 10 tons) bombs designed by Mr. B. N. Wallis, our bombers would not have been easily able to take what is called "evasive action" while they had those big bombs on board.

On the other hand, when the Fleet Air Arm attacked with carrier-borne bombers, which necessarily carry much smaller bombs, their losses were heavy. The reason was that the big R.A.F. bombers, with the very big bombs, attacked from an enormous height, incidentally with something very new and good in bomb-sights, which is purely a British design and invention; whereas the Fleet Air Arm craft, with lighter bombs and torpedoes, had to attack much lower down and well within reach of the light anti-aircraft automatic guns.

In the Pacific war equally queer things happened. At Pearl Harbour in Hawaii the land-based aircraft of both the Navy and Army Air Forces of the U.S.A. were taken by surprise by carrier-borne aircraft, in spite of plenty of warning from our sea scouts and from the U.S.A. themselves. It was a worse show than the loss of the "*Prince of Wales*" and the "*Renown*," which gaily set off from Singapore without any air cover at all, and surprised our Admiralty by getting themselves sunk by Japanese bombers from land bases.

But the U.S. Navy was very quick to learn, and the way in which they have developed their Fleet Air Arm is astounding. At the end of 1944 the U.S. Navy had, I am told on the best authority, between 20 and 25 Air Admirals, that is to say Naval Officers who are themselves pilots and have grown up with the Naval Air Service. The senior of them is an old friend of mine, Admiral Jack Towers, who was U.S. Naval Air Attaché in this country through most of the war of 1914–18. His contemporaries, Pat Bellinger and Duke Ramsay, whom I remember as very gay young Naval Officers about Town in 1917–18, are also Admirals, and a number of younger officers of the regular U.S. Navy have reached flag rank after years of experience of flying, both from the U.S. Navy's shore bases and from carriers.

The result is that the U S. Navy's Fleet Air Arm has done things on a scale which we have not been able to approach, not because we are short of the right type of pilot or navigator, but because we have never had enough carriers to do the work that we ought to have done.

If, at the start of the war, there had been half a dozen carriers in our Royal Navy, they could have kept up a continual air patrol of that gap in the middle of the Atlantic between the extreme limit of shore-based patrols on each side, and could have assured an open lane for our merchant shipping inside which German submarines would hardly have dared to operate. But, for lack of those carriers, we have lost hundreds of ships and tens of thousands of men.

The U.S. Navy was never up against quite such a proposition as that. By the time they came into the war that gap in the middle had been closed by V.L.R. (very long range) aircraft from each side. But the U.S. Navy did develop the little aircraft carriers, which are officially called "escort carriers" and more commonly "Woolworth carriers." They are nasty little things from which to operate, because in calm weather they cannot steam fast enough to produce enough breeze along the flying-deck to give a deck-flying machine the lift needed to get off their short hulls. And in rough weather they kick and roll so much that getting off or on to them is very difficult. We adopted the type, and we lost a lamentable number of aircraft, though fortunately not so many pilots, when they were trying to cover the landing at Salerno in Italy, because there was a flat calm at the time.

The U.S.A. have found (*Continued on page 250*)

Manning the Breakdown Crane

By "Shed Superintendent"

THOSE of you who have had the chance to see a breakdown crane at work will realise that a good deal depends on the knowledge and skill of the crew. Mishandling may cause muddle and delay, and even result in the overturning of the crane, which is rather an ignominious mishap when the crane has been sent to clear wreckage, not to add to it!

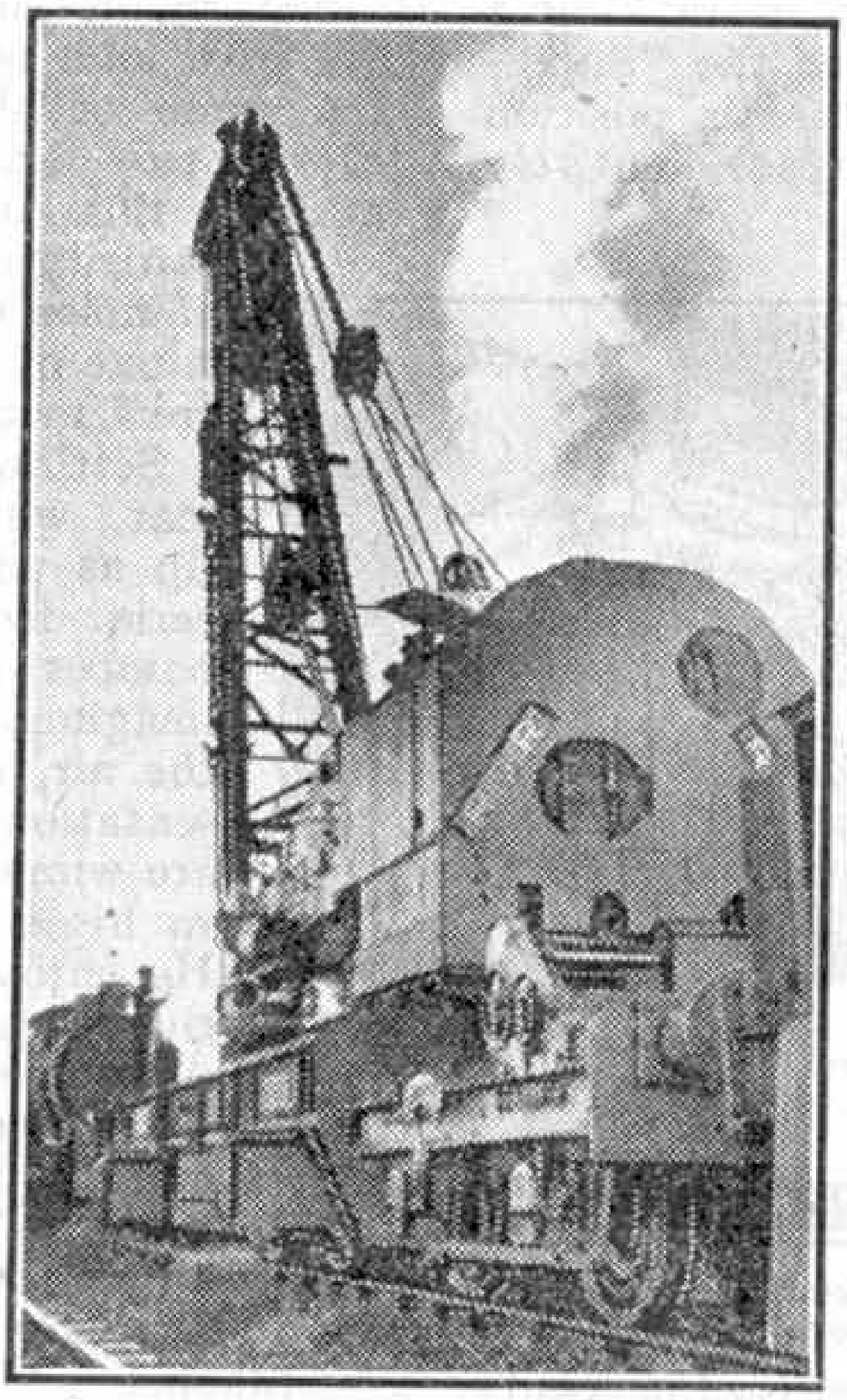
A crane crew is normally made up of four men; Chargeman, Crane Driver and two Slingers, who are selected from the staff of the Motive Power Depot to which the crane belongs. In rowing parlance, there is a "1st Four," and a "2nd" and "3rd Four" as well, any member of which may be called upon to fill a vacancy in the "1st Four," when required. This means that there is always a trained crew available at any moment.

Let us take the duties of each member of the "1st Four" in turn.

The Chargeman is the only man authorised to give directions to the Crane Driver, and, as a point of principle, the Crane driver ignores instructions given by anybody else, except the cry of "Whoa," which can be given by any man in the breakdown gang who observes something going amiss.

On arriving at the job, the Chargeman sizes up the situation in conference with the Shed Superintendent, to decide a plan of campaign. A clear understanding is reached as to the position in which the crane is to work, taking into account various factors such as the proximity of overbridges, telephone wires, etc., and the foundations, which must be strong enough to bear a concentrated weight.

The Crane Driver must be calm and steady, and have that touch which makes the expert. Both he and the Chargeman know what their crane will lift at any given radius of the jib, and such details as the distance to which the hook will lower below rail level, over the side of an embankment for instance. The Driver maintains the fire and water in the crane boiler; there is seldom room for a fireman on the crane platform. When the crane is at the Depot, steam is kept in the boiler at all times, and the Driver is usually employed in looking after the crane, of which he makes quite a pet.



A 45-ton Breakdown Crane at work.

The two Slingers, as their name implies, handle the chains or slings kept on the jib-truck of the crane, and attach whichever kind is required for the job in hand. The pairs of chains commonly used are known as "brothers," and several pairs of different strengths are carried.

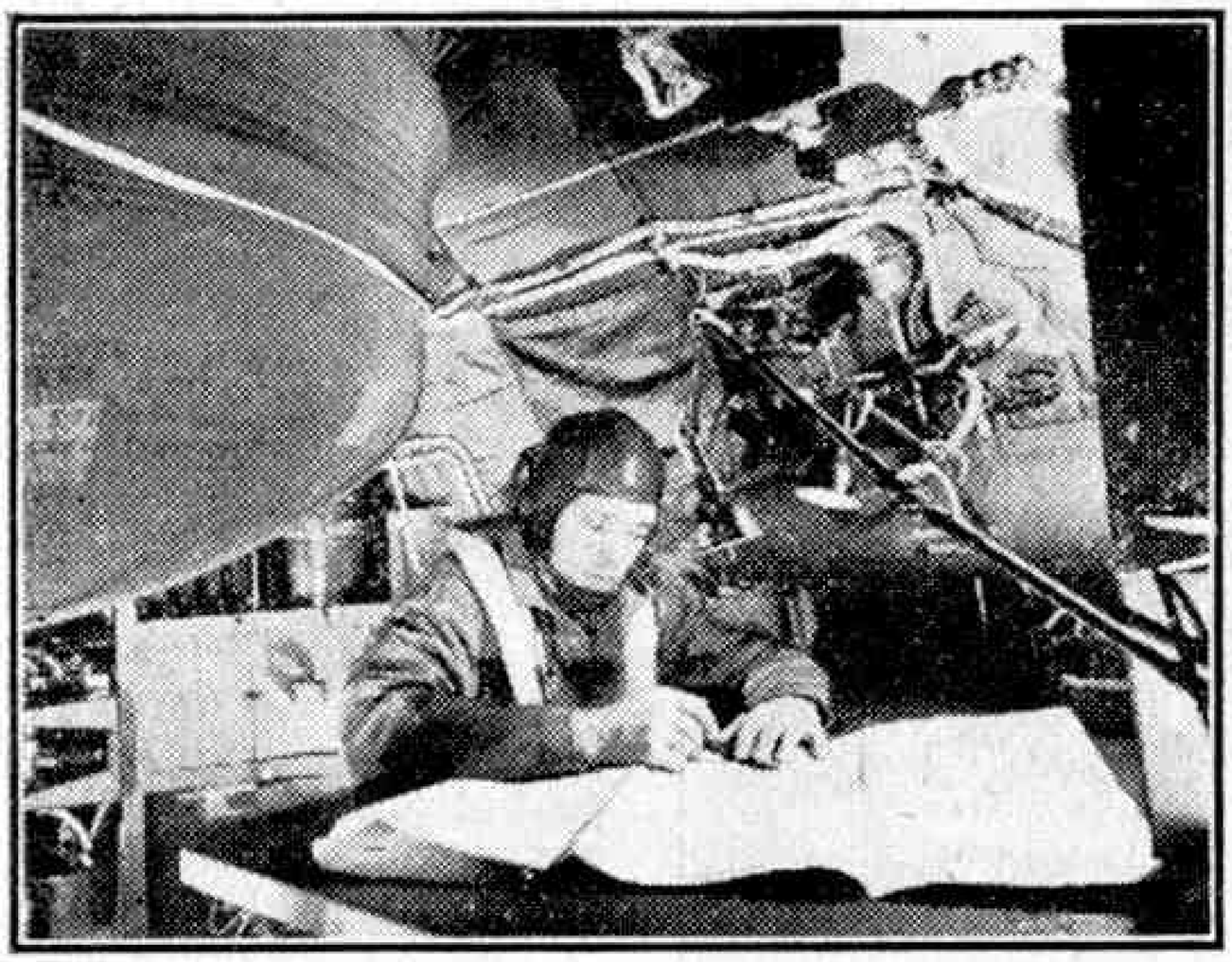
When the lift is being performed the Slingers stand one on either side of the crane, to watch for any sign of overbalancing. Wherever possible the side support girders are racked out from the crane to give additional support, and on wet ground these have to be carefully packed up and watched for any sinking under load. It is a sound principle never to lift a load too high if the weight of it approaches the maximum capacity of the crane. In such circumstances a short lift enables the weight to be run off quickly if the crane wheels should rise off the rail on the opposite side to which the lift is being made.

These notes will give some idea of the routine which is necessary to make crane work safe, sure and rapid. It is practice that makes the good crew, and no crane is idle for long, as it is constantly in demand for bridge building, loading tanks and many of the heavy rail-borne loads such as transformers for sub-stations. Dealing with occasional, and fortunately infrequent, train accidents forms only a small proportion of its work.

Through a "Superfortress"

By Michael Lorant

IF you can imagine riding in a seat built on the radiator of an automobile, protected in front by a windshield the shape of half an egg, you get the same general impression as sitting in the bombardier's position in a Boeing B-29 "Superfortress." This vantage point, or A1 priority seating, which the bombardier enjoys in the very tip of the B-29's "greenhouse," gives the first vivid impression one experiences in making a minute interior inspection of the "Superfortress" from nose to tail. His position seems to be a seat in space, entirely surrounded by glass.



The navigator, who charts the course of the "Superfortress" during its long bombing missions, at work at his table.

A tour of the B-29 interior is of necessity a slow job. The big bomber is divided into five sections, three pressurised and two unpressurised. This means climbing through doors in the bulkheads which separate the sections, and crawling through the 35-ft. tube which overpasses the unpressurised bomb bays. And in between these bulkheads every bit of space not needed for accommodation of crew members or for actual passage through the machine is taken up by myriad equipment and installations which go to make this bomber the deadliest of America's air weapons. You must climb over some of this equipment, duck under other of it and squeeze around still more.

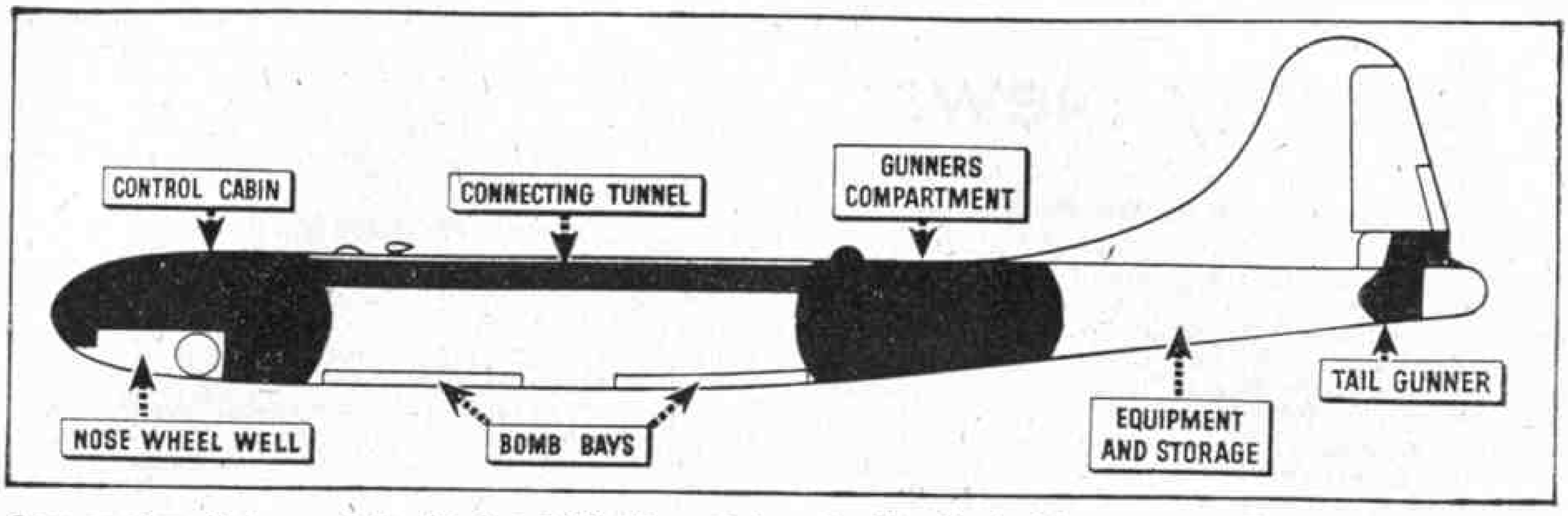
If you are going through the B-29 on a warm sunny day, you make a mental note as you approach the machine and see the sun's rays glinting off the bright metal for the full 99 ft. of its fuselage, that it is going to be very hot inside. However, as you ease yourself through the hatch into the nose or control cabin of the aeroplane, you are agreeably surprised. The efficient insulation which lines the cabin cuts down the absorption of heat. It is warm enough, but it is not what you had expected.

This insulation likewise protects against the cold, and, equally important, deadens the noise of the engines during flight. Flyers tire less readily when protected against this terrible beating on their eardrums. In fact, the minimum of noise in the B-29 control cabin is one of the things with which the crew members are most impressed.

Settling into the bombardier's seat, which is as near the nose tip as possible, you experience an eerie feeling, even though the bomber is on the ground. You imagine that the bombardier, in the air, must experience the same sensations as a flagpole sitter. There are windows below him, above him, to his sides and in front of him. He enjoys a wider range of vision than any other crew member. At one side of the bombardier is his precious bomb sight, which he can swing in front of him to operate on bombing runs. At these times he is in command of the ship, directing the course to be taken.

The pilot and co-pilot sit behind the bombardier, the pilot on the left side of the machine and the co-pilot on the right. Their seats are slightly higher than that of the bombardier. They can see over the latter's head and have almost as wide a range of vision as he.

One of the characteristics of the B-29 is the fact that the pilot and co-pilot have very few dials in front of them—just enough to permit them to take the machine into the air, keep it there and land it. The maze of dials and meters usually found in the cockpit of an aeroplane are mostly in front of the flight engineer, whose position faces towards the rear of the aeroplane, his back to the co-pilot. Engine speeds, oil pressures and the like are his worries, leaving the



Cross-section diagram of the Boeing B-29 "Superfortress." The blacked-in areas are those which are under pressure when the big bomber is flying at great height.

pilots free to concentrate on the actual flying of the bomber. The navigator sits behind the pilot, while the sixth occupant of the control cabin, the radio operator, has his station behind the flight engineer's instrument panel and next to the bulkhead which separates the cabin from the bomb bay section.

The trip from the control cabin to the gunner's compartment is an experience. The two are connected by a cylindrical tube which runs through the top of the bomb bays and is of ample size through which to crawl. The tube is insulated like the control cabin and the gunners' compartment and, of course, is under the same pressure conditions as these two compartments.

You pull yourself into this cylindrical passageway and look down its 35-ft. length. The sensation is like that of peering in the wrong end of a telescope. At the far end, a long, long way, it seems, you see the pedestal seat of the top gunner. It appears to be a toy chair.

The pilot sit on the left of the control cabin, and the co-pilot, seen here, on the right.

As you crawl along you are impressed by the stillness. The only noise is the soft scraping of your clothes against the canvas covering of the insulation. It is difficult to realise that on bombing missions, tons of death and destruction will be carried beneath this tube passageway. As you crawl along you think that this is no place for a victim of claustrophobia!

Finally you pop out into the gunners' compartment. In the centre, much larger to the eye now, is the pedestal seat you noticed at the beginning of your long crawl. The top gunner sits here, his head up in the plexiglass blister on top of the fuselage and directly above the chair. In this blister, leaving just enough room for the gunner's head, is the sight and mechanism which fires the guns over which the gunner has control. This crew member has vision in every direction above the bomber's fuselage. In this compartment, also, are the two side-blister sighting stations. Each gunner has a seat alongside his blister and his vision is to the side of the aeroplane.

The pressurised gunner's compartment is divided into two sections. You pass from the actual fire-control section through a bulkhead door into the crew's quarters, where folding bunks are provided for relief crew members. Thus, on long missions, some men can rest en route to the target and be fresh on arrival to relieve gunners who have been on the alert on the long trip.

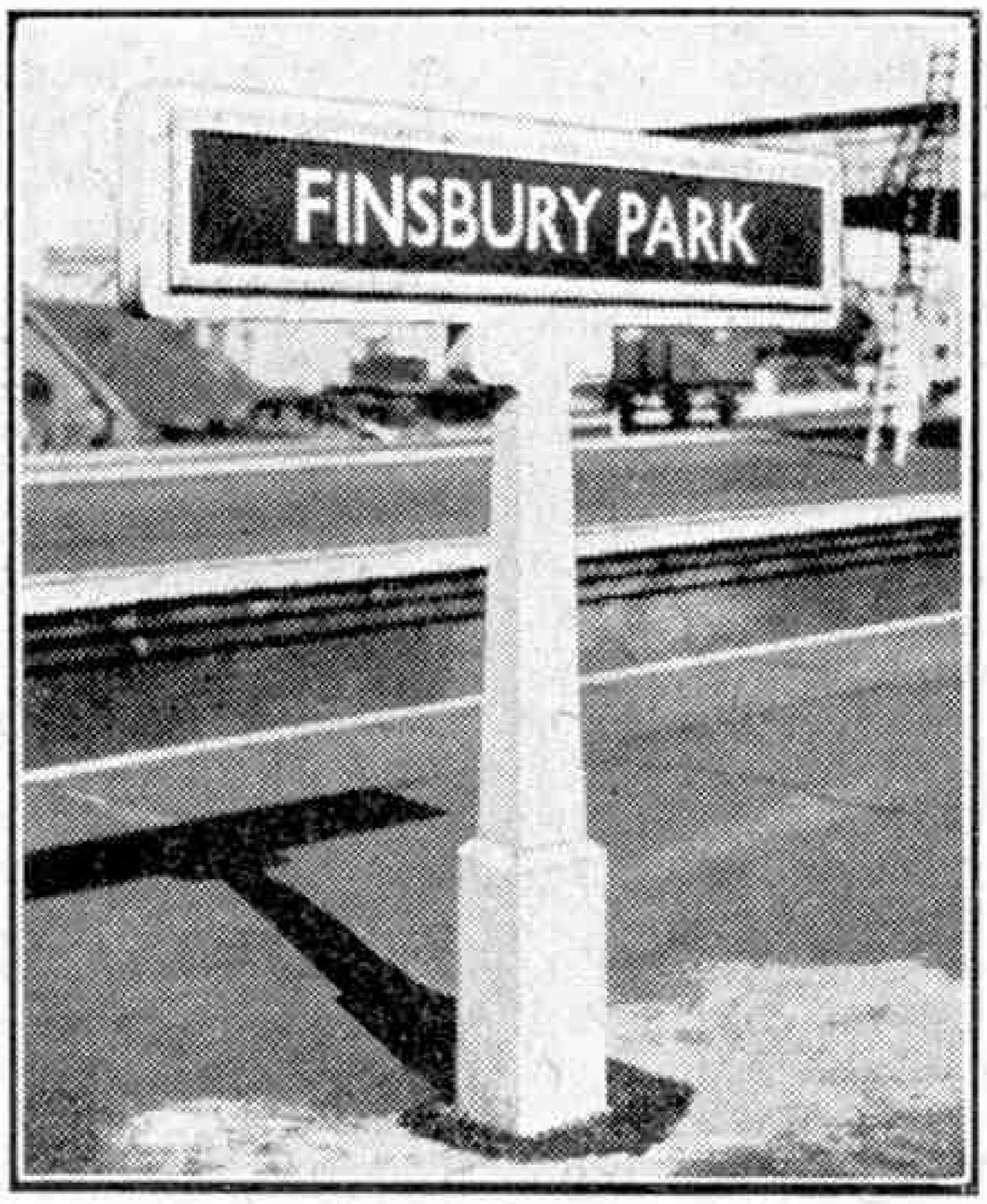
Next comes another pressure bulkhead which separates the crew's quarters from the aft compartment. This latter portion of the fuselage is unpressurised and in it are installed the auxiliary power plant and other equipment. When you enter this compartment you are nearing the tail of the ship and the fuselage is diminishing rapidly in diameter, so you (*Continued on page 250*)

Railway News

Finsbury Park and its New Nameboards

The L.N.E.R. are experimenting with a new type of station nameboard that may become standard for all stations on the system. The accompanying photograph shows the new board at Finsbury Park. It is intended to have from two to five such boards on each platform, according to the size of the station, thus giving plenty of indication as to their whereabouts to passengers. Being clearly readable and at eye level, these nameboards of simple yet modern design will give extra platform space, as each is supported by a single concrete post. The lettering is in "Gill Sans" type white letters, 4 in. long, on a vitreous enamel plate with blue background.

Finsbury Park is one of the most important junctions on the north side of London, being situated on the East Coast main line, Great Northern section, 2½ miles from King's Cross. It is surrounded by large carriage sidings and freight marshalling yards. At the south end, by means of a direct and a "burrowing" junction, connection is made along the Canonbury line with the North London and North and South West Junction sections of the L.M.S. This provides an important route for interchange of freight and special traffic, as well as for through L.M.S. suburban passenger trains to the L.N.E.R. system in normal times. The suburban lines to Alexandra Palace, High Barnet and Edgware branch off at the north end, involving a steep gradient and a "flying" junction. These routes are now partially operated north of Highgate by the L.P.T.B. Northern Line electric services; plans also have been made to extend the "City" electrified line through additional new platforms at Finsbury Park main station so that L.P.T.B. (former Metropolitan) trains, built up to full gauge, can work through to Alexandra Palace.



The new type of L.N.E.R. station nameboard at Finsbury Park Station. Photograph by courtesy of the L.N.E.R.

At present the terminus of the "City" line from Moorgate is at one level beneath the L.N.E.R. station, and the through Piccadilly tube station at another. Before the extension of the Piccadilly tube to Wood Green and Cockfosters, when this terminated at Finsbury Park, the L.N.E.R. station was at its busiest, as many thousands of passengers made a change there from tube to steam trains, or vice-versa, or from one steam train to another, every morning and evening.

In addition to the down goods line and shunting tracks on the west side, there are seven through passenger tracks in the main station and ten platform faces. Several of the suburban lines have platforms on each side and it was quite usual for passengers to use a standing, occupied train as a bridge to get from one to another. Frequently, after making connection with each other, all within the space of a minute or so three local or outer suburban trains would start off together on both up and down sides at busy periods, on parallel tracks, all steam hauled with G.N. type 0–6–2 tank engines predominating. A number of semi-fast and long distance main line trains call, and there is heavy goods traffic of all types; many classes of L.N.E.R tender and tank locomotives may be seen at Finsbury Park under present conditions.

A Trio of Record Breakers

"*Silver Link*" and "*Quicksilver*," the first two L.N.E.R. streamlined "Pacifics," were recently transferred to Grantham shed. They had been at King's Cross depot since their construction in 1935, with two others, for working the "*Silver Jubilee*," the pioneer streamlined, high-speed express that went into service between London and Newcastle in September of that year amid remarkable demonstrations of public interest.

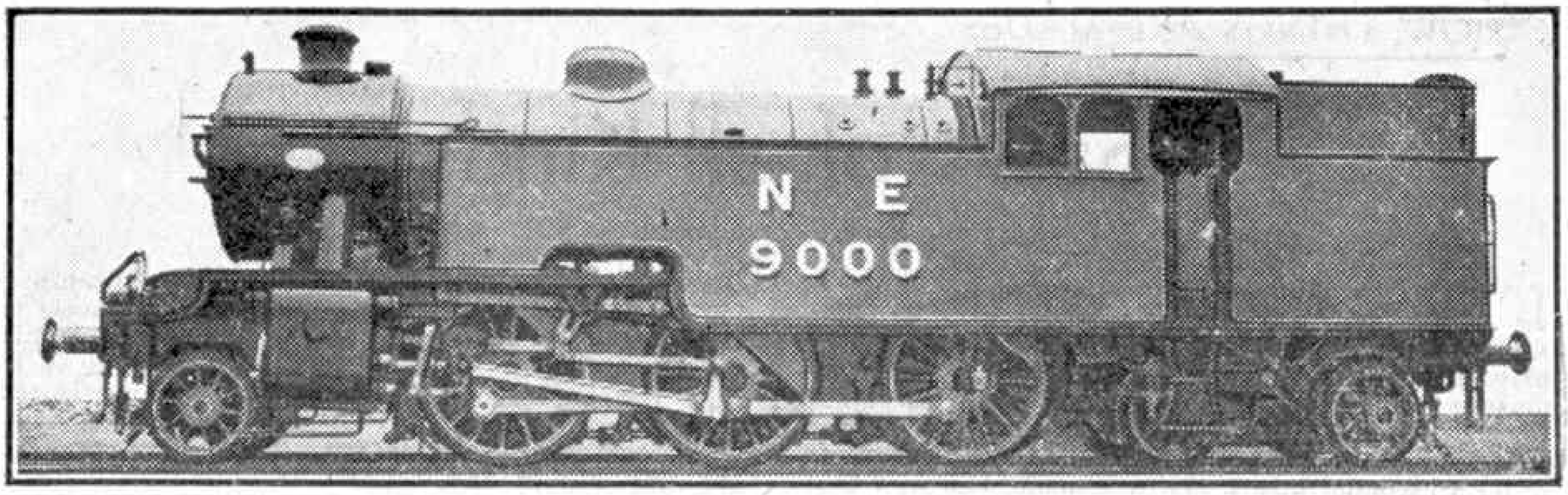
"*Silver Jubilee*" was one of the fastest long-distance steam trains in the world, being booked to cover 232½ miles in each direction start to stop at an average of 70½ m.p.h.; it was very successful in operation, every seat being booked in advance on many occasions. No. 2509 "*Silver Link*" worked this express 560 times, or on more than one quarter of its total number of runs between 1935 and 1939 when this train, and "*Coronation*" and "*West Riding Limited*," its two fellow "flyers" introduced in 1937, were withdrawn on account of the war crisis. This was in addition to many other main line duties shared with the later built "A4" class engines. "*Silver Link*" created several world speed records, including the remarkable one she still holds of averaging 100 m.p.h. for 43 miles, with a maximum of 112!

Also at Grantham is No. 2750 "*Papyrus*," of the earlier "A3" 4–6–2 class, which on 3rd March 1935, when on a test run from Newcastle to King's Cross, attained the then record maximum authenticated steam speed of 108 m.p.h. Completing a notable trio is No. 4468 "*Mallard*," the engine that thrilled the railway world on 3rd July 1938 by working up to 126 m.p.h. during a trial run towards Peterborough, so creating a new record of records, which may well remain unbeaten for a long while.

No. 4498, the 100th Gresley "Pacific," named after her late designer, Sir Nigel Gresley, is another Grantham engine at present. This shed provides power for many of the most important and heaviest expresses between King's Cross and Newcastle. Despite wartime difficulties in the way of poor fuel, reduced maintenance, heavy loads, signal delays and so on, the "top-link" engine crews stationed there and some of their deputies are maintaining an excellent reputation for timekeeping, and for endeavouring to make up lost time when circumstances permit.

Locomotive Notes

The number of locomotives shipped for service under Allied auspices on the Continent of Europe now exceeds 1,000. Many of these, of the 2–8–0 British "Austerity" or U.S.A. types, had already been running in this country for two years or more



L.N.E.R. 2-6-4T No. 9000, the first of the new L1 class. Photograph by courtesy of the L.N.E.R.

before being overhauled in British workshops and despatched thence to a port. There have been many strange cavalcades passing along our main lines, such as trains of "dead" W.D. 2–8–0s, often in batches of four, being towed by one of their number, or more often by a goods engine of the line over which they were passing. A number of 2–10–0 as well as 0–6–0 tank and other locomotives have also been despatched recently from this country.

New "Merchant Navy" class 4–6–2 mixed traffic engines on the S.R. up to No. 21C 17 are reported in service at the time of writing. Further namings include No. 21C 12 "*United States Lines*" and No. 21C 13 "*Blue Funnel.*" It is a foretaste of happier and more normal times to come, to note that some of these "Pacifics" are being painted bright green, with appropriate lining-out, and to hear that some other S.R. express engines are coming from Works similarly finished.

We understand that the first of a new L.N.E.R. "Class "L1" 2-cyl. 2–6–4T has been completed at Doncaster, Works No. 1984, to the design of Mr. E. Thompson, Chief Mechanical Engineer, and has commenced trials. The engine is illustrated on this page. It is painted green and numbered 9,000, having a number of features standard with "B1" 4–6–0, but driving wheels 1 ft. less in diameter at 5 ft. 2 in. The tractive effort is 32,000 lb. and the total weight in working order is just under 89½ tons. Equipment includes electric lighting, B.T.H. speed indicator, Westinghouse air-brake and left hand drive. All cab gauges are grouped into a single, enclosed panel. The former "L1" engines have been re-classified "L3."

Of the series of new 2–6–4Ts under construction for the L.M.S. at Derby Nos. 2673–8 are now in traffic They are not compound, as had been rumoured.

When the locomotives of the Midland and Great Northern Joint Railway were taken into L.N.E.R. stock in 1937, there were over 40 4–4–0s, though many were elderly and not in good condition. A number were of the former Midland Johnson design and had been rebuilt as recently described and illustrated in these notes, doing good work for many years. All have now been withdrawn from service, making L.N.E.R. Classes "D52–4" extinct.

L.N.E.R. Post-war Standard Third-Class Coach

A new type of third-class corridor coach, similar in design to the first-class coach described and illustrated on page 118 of the April "*M.M.*," has just been completed by the L.N.E.R., and an illustration of it appears on this page. In it there are seven compartments arranged in three groups, separated by two corridors across the width of the coach. The end groups consist of two compartments, so that the distance from any compartment to the exit door of the coach is reduced to a minimum. In each compartment there are three seats a side, with arm rests. The windows are longer and deeper than those of the previous standard coaches, and the windows in the corridor are spaced opposite those of the compartments so that the occupants have good views on both sides of the line. Upholstery and fittings generally are all of high class and lighting is ample, a 30W roof lamp being supplemented by four 15W shoulder lights.

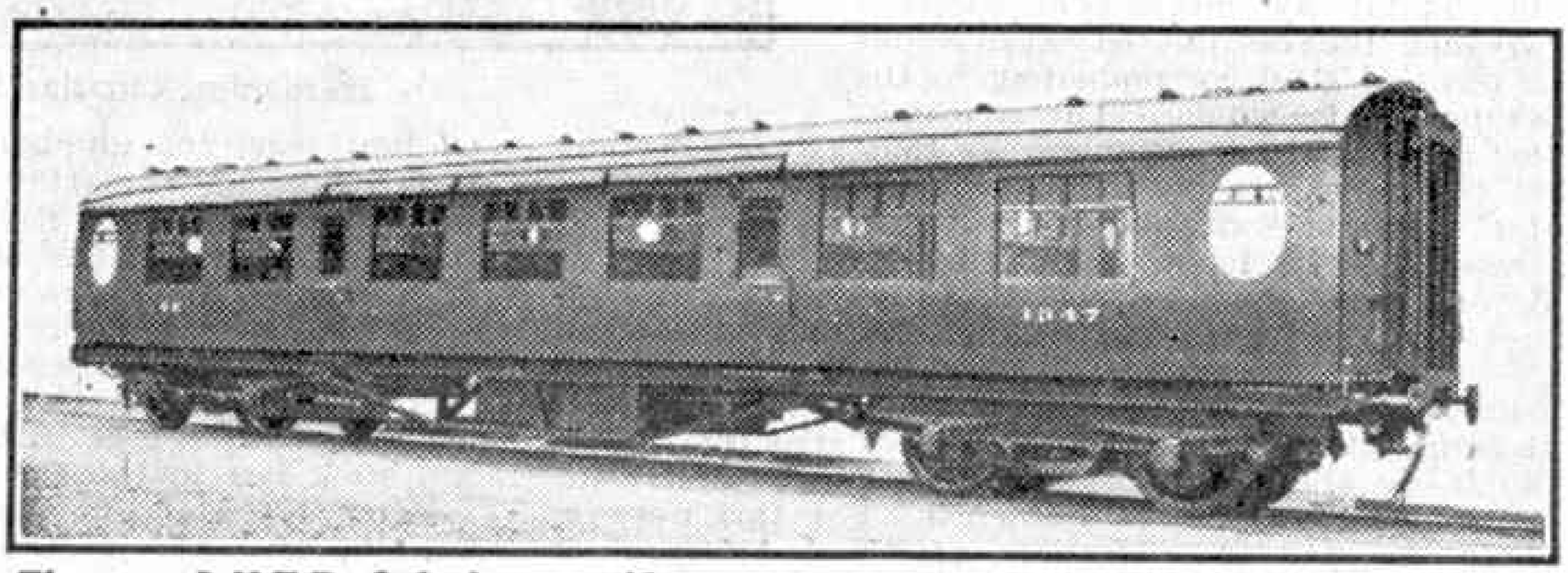
New L.N.E.R. Signal Boxes Planned

The L.N.E.R. have designed standard signal boxes of modern construction for both mechanically and power operated types. These are fireproof, of brick construction, and there will be continuous windows along the front and sides, with a projection above the windows to exclude glare from the Sun. The name of the box will be displayed at each end, and also on the front where necessary.

The sizes of the cabins are to be standardised as far as possible. Their length will depend on that of the lever frame. The width also depends on this and on the site, but in mechanically worked boxes it will be 12 ft. clear inside, and the signalman will work with his back to the running lines so as to keep the windows clear of signalling apparatus. Mechanically worked boxes will have a floor not less than 8 ft. above rail level, and in power worked boxes this height will be about 11 ft.

Electric lighting will be provided in power worked boxes, which will be heated on the low pressure hot water system and in which cooking will be done by electricity. In mechanically operated boxes there will be a stove for heating, with an oven, and a gas ring will be provided where gas is available.

The first box built to the new plans has been erected at Brunthill, near Harker, north of Carlisle.



The new L.N.E.R. 3rd class corridor coach described on this page. Photograph by courtesy of the L.N.E.R.

HOW THINGS ARE MADE:

Saws of all Kinds

By Eric N. Simons

EVERY boy interested in making things must at some time or other have tried his hand at using a saw. I can remember in my boyhood endeavouring to wield a real man's saw, and finding my immature muscles quite incapable of driving the steel blade through a plank with sufficient force to saw a dead straight line. At that time I do not think it occurred to me to wonder how a saw was made, and now that I know, having lived and worked among saw manufacturers for more years than I like to tell, I feel sure many readers of this journal will be interested to have an account of the intricate processes involved.

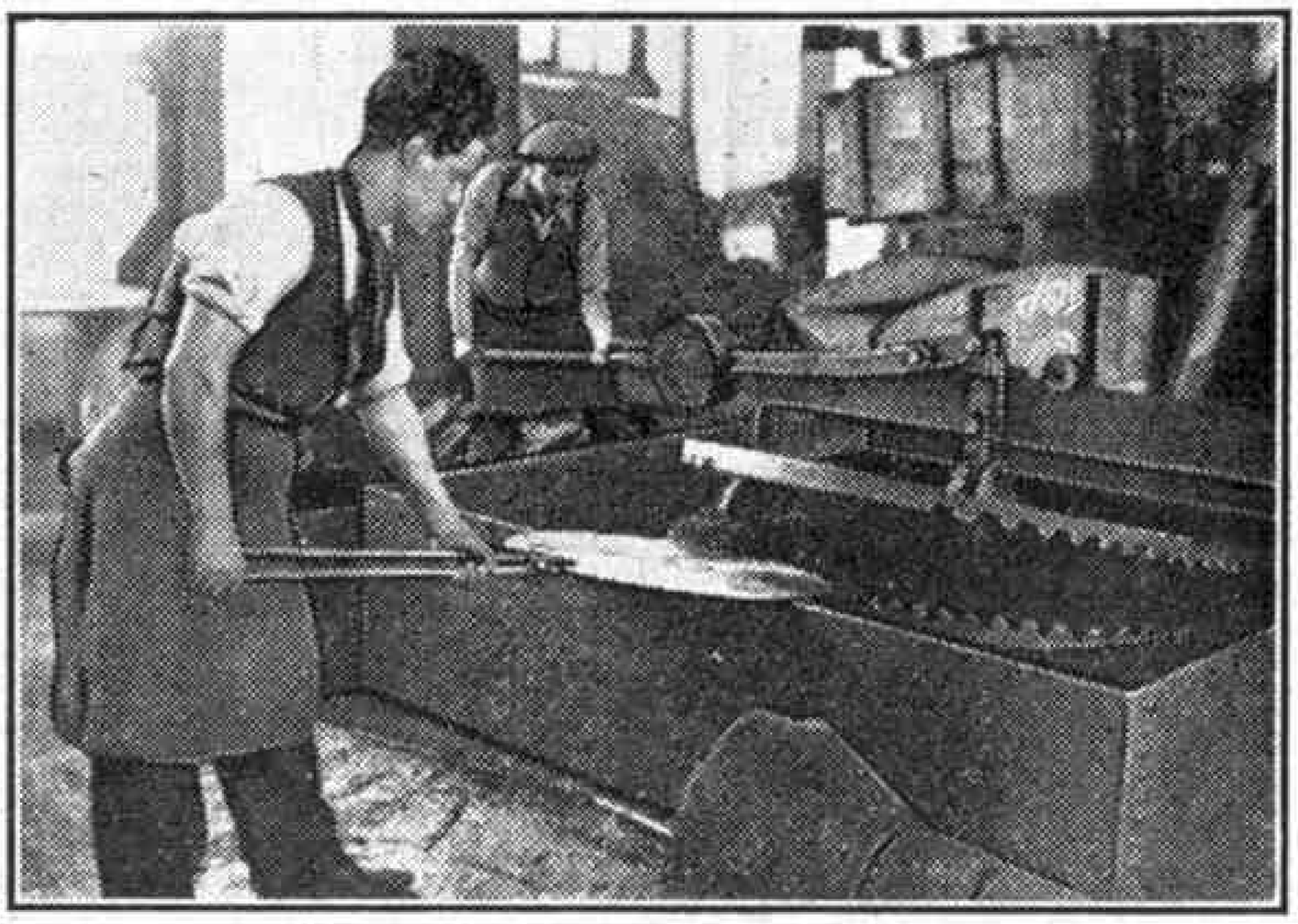
All the difference between a good saw and a bad one may be made in course of manufacture. The first stage is a steel slab, made by one of the steel-making processes described in a previous series of articles in this magazine. This slab has to be large and heavy enough for a number of plates to be rolled from it. It is passed through a giant steel mangle called a rolling mill, and formed thus into sheets of suitable thickness. These sheets are heated up in a furnace to a specific temperature, so as to remove by softening them all the strains that have been set up in the metal by rolling.

These rolled sheets will have irregular, ragged edges after they have been rolled and heat-treated, so they have next to be pared to rectangular shape and trimmed down to the right size. This is done by large shear blades, as they are called, which are really like enormous scissors worked by machinery. The next stage is the provision of the necessary teeth, without which the saw could not cut. For this work a punching machine is used. A punch is a steel cutting tool formed to the required shape, and driven into the metal by mechanical pressure so that the cutting edges bite out a piece of steel corresponding to the shape of the punch. The machines for this work are automatic, so that at each descent of the punch the blade moves on a little to prepare for the next tooth-punching; the punch rises, and then descends for a fresh stroke to form the following tooth.

If the saw were used just as it is after the teeth have been punched out, it would either not cut or cut very badly, because the steel would be too soft, having still retained the annealed structure given to it by the softening treatment earlier described. It must, therefore, be hardened. For this purpose it is inserted in a modern electrical or gas-fired furnace heated to a specific temperature. It is thoroughly heated to and at the hardening temperature, which must be chosen carefully to suit the type of steel of which the saw is made; after which it is taken out and plunged at once into a large tank containing either whale oil, or some other type of oil. This operation is termed quenching, and the relatively sharp cooling action "freezes" the structure produced and gives the desired hardness to the steel.

This does not complete the heat treatment required, for a further operation known as tempering is necessary. The saw blade is again gradually heated. This slightly reduces the hardness, which, if this tempering were not done, would be inclined to make the saw too brittle, so that it would break rather than bend. In a short time after leaving the tempering furnace, having cooled down, the saw travels to the smithing shop. Here are a number of highly skilled craftsmen or saw smiths. Their task is to take the hardened blade and, by the experienced employment of a number of specially shaped hammers, hammer the blade flat. This means that all the tiny humps and hollows or other irregularities in the surface, inevitable after so many preliminary operations, must be discovered by means of a special straight-edge, and flattened out. Any warping or distortion must likewise be eliminated by the saw smiths.

It is not superfluous to dwell for a moment on the work of these men. The hammers they use are sometimes extremely heavy, and the irregularities detected and remedied are often so small as to escape the notice of an ordinary person altogether.



Hardening Circular Saws.

Of late years the number of skilled saw smiths has been declining, a matter for serious concern in the Sheffield district; but it is believed that during the war the opportunity has been taken to train a number of younger men in this exacting and valuable trade.

Having been hammered, the saw has now to be ground so as to produce a better and more attractive steel surface, and possibly to give the essential clearance in cutting, so that the teeth shall not stick fast in the cut when sawing is done.

After the saw has been ground, the teeth must next be set. This means that the teeth are slightly deflected by special tools so that one goes to the right, the next to the left, and so on. There are different types of setting, but most handsaws are set alternately to left and right. The setting of the saw teeth means that each tooth does only about fifty per cent. of the work of making the cut, so that sawing is done faster, with less effort, and a less expenditure of power, than if the entire width of the cut had to be dealt with by each tooth. It should be remembered that each tooth is virtually a separate cutting tool.

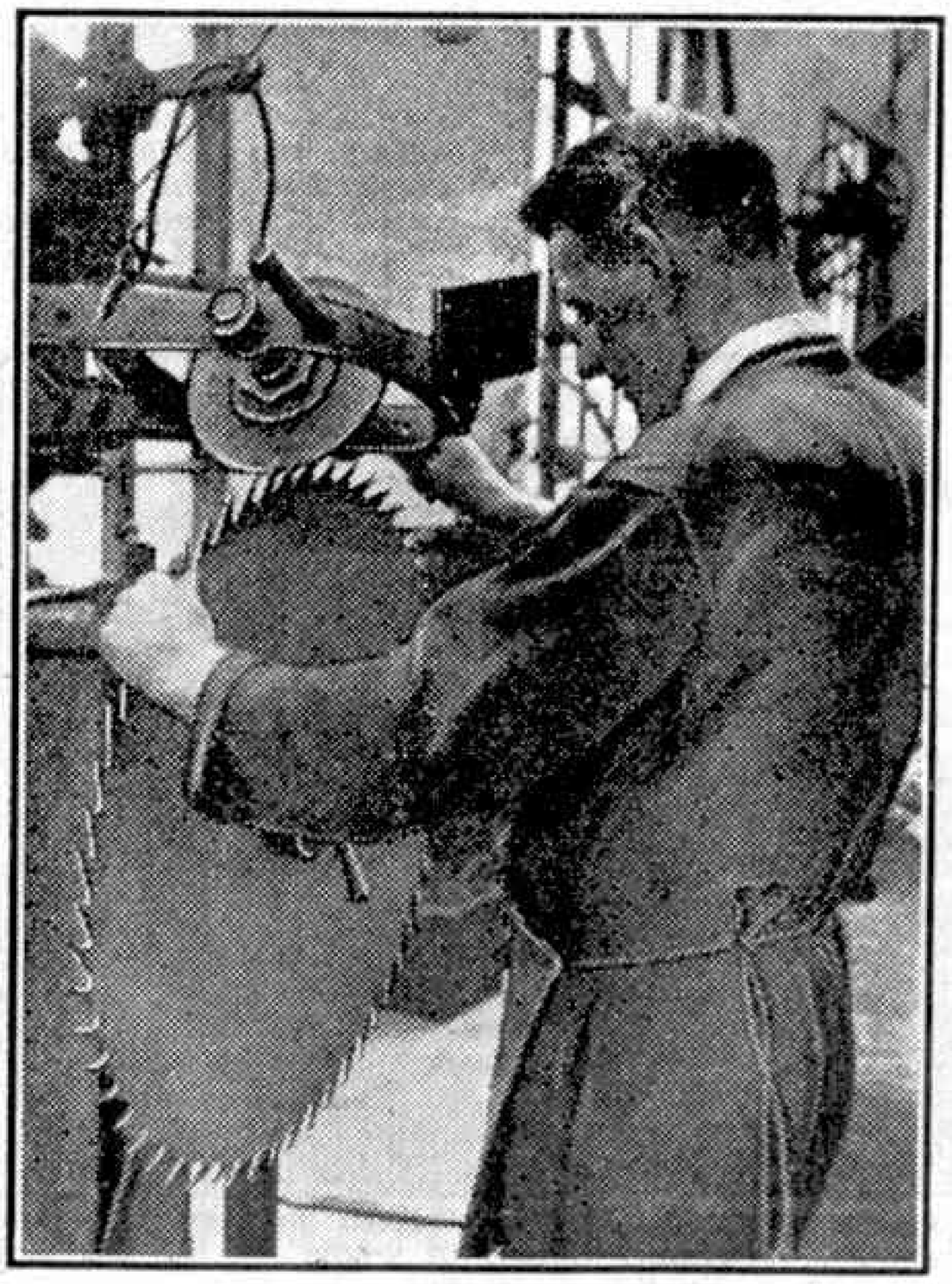
The saw, having been ground and the teeth set, must then be polished on a special machine, and treated with emery powder, a highly abrasive material, which helps to produce a clean surface and the bright

finished appearance so typical of a good, well-kept saw. The grinding and polishing operations are essentially abrasive actions and in consequence they generate a good deal of frictional heat. The effect of this heat is to soften the steel to some extent, thus reducing its cutting power. Heat may cause also a slight distortion leading to loss of flatness. Because of this it becomes necessary, on completion of grinding, setting, and polishing operations, to return the saw to the saw smiths to be "blocked" or rehammered until it is once again perfectly true. This final hammering is a most delicate operation, demanding extreme skill and patience on the part of the smith.

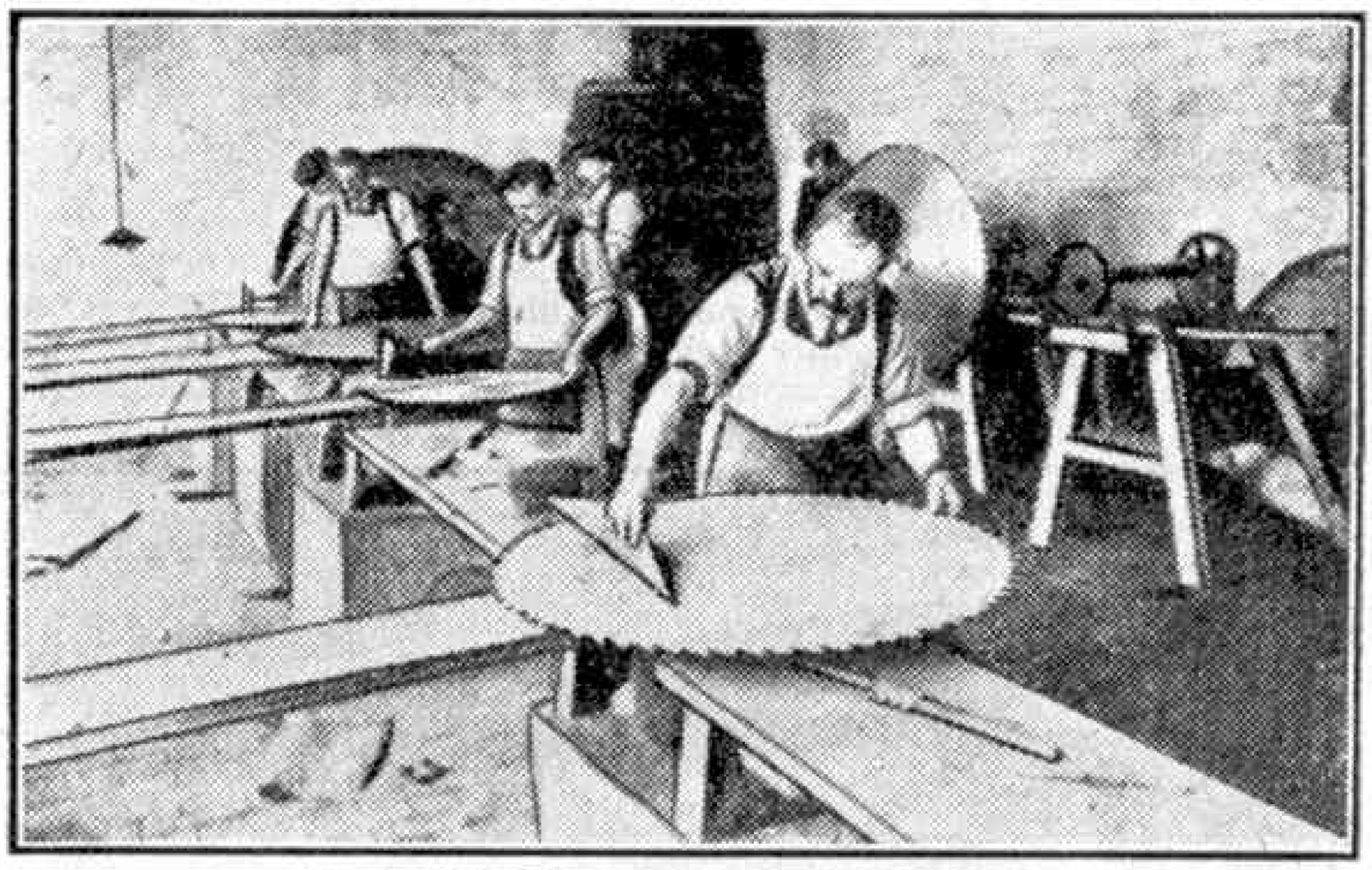
The saw is then handled, and packed, and passes to the point of purchase or consumption.

Circular saws for cutting wood are common in joiners' shops, and the main difference between these and the handsaws is one of cutting speed. The circular timber and wood saws, being mechanically driven, run much faster than a handsaw, and in consequence the form and spacing of their teeth must be different. The teeth individually must be given a slight curvature to conform to the circular form of the saw, and they must also be spaced somewhat farther apart since they run at so much higher a speed.

In general, the processes by which they are made correspond to those employed in making handsaws, the differences being largely the result of the form of the blade, which is circular instead of rectangular. The flatness and tension of circular saws has to be tested with the utmost care by means of the sawmaker's straightedge, and afterwards special machines are used for the purpose. No saw leaves the maker's works until it has passed all the severe tests given.



Grinding the teeth of the saw.



Smithing of saws by "saw doctors."

This is specially necessary where a flange or collar has been fitted on the finished saw blade in readiness for affixing it to the shaft of a sawing machine. This fitting of flange or collar upsets the saw's tension to some degree, but only the skilled saw smith can detect and remedy the trouble.

The circular saws are placed on an automatic emery topping machine, which grinds a uniform surface on each tooth and gives the saw at the same time a perfectly true circumference. The final setting and sharpening are normally done by the actual user of the saw. It is usual to run the saw on a spindle at the maker's works before it is sent away, to make sure that it revolves truly.

Circular saw blades have also to be furnished with centre holes, bolt holes, and rivet holes, the first being for the saw spindle to fit into, and the bolt and rivet holes for the securing of the collar in position. After the blades have been hammered flat, from the rough plate, they must therefore be sent to a machine shop to be bored and drilled accurately.

When being hardened by immersion in a bath of quenching oil, it is usual for the saws to be gripped between the jaws of a strong clamp, as this prevents them from buckling and distorting to any great extent.

The fretsaw is another type of saw with which most boys are familiar. The process of making these saws and bandsaws is much the same as for handsaws, except that the steel is no longer a sheet, but a thin strip, which is rolled from an ingot, hardened, tempered, the ends squared off, and the toothless strip hammered dead flat. The grinding operation follows, the blade being ground to the desired thickness, the sides being left rather thinner than the back.

Before the teeth are provided, the blade must be made exactly uniform in width. Hot and cold rolling are certain to have resulted in minute variations in width in the long, narrow steel strip, however carefully these operations may have been performed. For this reason the width is made exact and uniform by mechanical shearing or by grinding, which also produces a good, square, accurate edge as a basis for the operation of providing the teeth. This edge is improved and made exact by grinding in a special machine.

In grinding, softness resulting from frictional heat may have been caused, so a file is used to test the hardness along the edge. If softness is present, the file teeth will bite easily into the steel. The teeth are then produced by a milling machine, in which a rapidly rotating steel milling cutter with suitably formed teeth cuts out the saw teeth successively. Another method, for the larger saws, is to punch out the teeth in a power press one at a time, using a die. Rehammering follows to restore flatness and uniformity, and to give the blade the right tension.

A further grinding (*Continued on page 250*)

On the Road

NOVEL IDEAS IN BUS DESIGN

There have been some interesting bus developments in recent months and on this page we illustrate two types of bus that introduce novel principles. The two have one feature in common. This is a central entrance provided with pneumatically-operated doors controlled by the conductor, so that passengers can only leave or enter when the bus is at a standstill.

This illustration shows the smooth and pleasing appearance of the "Safety First" buses introduced in Blackpool. Photograph by courtesy of Blackpool Corporation Transport Department.

Our upper illustration is of one of the Blackpool Corporation "Safety First" buses. These buses were designed to try and reduce the number of "step" accidents. Before their introduction, bus accidents in the Blackpool area involving passengers boarding or alighting from vehicles were in the ratio of one in every 28,874 miles run. At the time of writing accidents of this nature have been reduced to one for every 166,000 miles.

The Blackpool bus is fitted with a dual staircase designed primarily to speed up the loading and unloading. It is interesting to note that at the request of the Ministry of War Transport one of these buses was loaned in turn to the Transport Authorities of Manchester, Sheffield, and Leeds. We have no details of any official reports from these cities, but we understand that Manchester Corporation found the bus unsatisfactory owing to its seating capacity being lower than the standard type in operation. It has been suggested that the removal of one of the staircases would overcome this difficulty.

It will be interesting to see what influence this type of bus will have on future designs. Perhaps we should mention here that although Blackpool Corporation must be given credit for having developed the use of this type of bus they are by no means the pioneers. Buses with a centre entrance and closing doors have been in operation in different parts of the country for a number of years; Wallasey Corporation introduced one as long ago as 1933.

PAY AS YOU BOARD

The lower illustration shows the experimental "Pay-As-You-Board" bus which the London Passenger Transport Board placed in operation in October of last year. The bus is a standard A.E.C. vehicle of the STL type converted. As already mentioned, the orthodox rear-end platform has been replaced by a centre-entrance platform, the latter having pneumatically-operated sliding doors. The staircase is situated in the centre of the bus on the off-side. Opposite the doorway is a counter, behind which the conductor sits, and on this is a ticket-issuing machine, which is similar in general appearance to a Cash register. This machine, which was supplied by the National Cash Register Co. Ltd., of London, records the amount of the fare, and the type of ticket issued, that is, "ordinary," "child," "return," and "transfer." To issue a ticket the conductor simply depresses one of the keys according to the type of ticket required, and when it is necessary to give change this is obtained from three open money containers.

Passengers using this bus have been asked to contribute towards the success of the experiment by allowing alighting passengers to get off the bus first, having the exact fare ready when boarding, and moving quickly to a seat after paying the fare. If seating accommodation is not available, and standing is necessary, they are asked to move away from the platform as quickly as possible.

* * * *

The L.P.T.B. has also placed in service a "Pay-As-You-Board" trolleybus. This is a standard six-wheel double-deck vehicle that has been altered in a similar manner to the bus already described, but tickets are issued by means of a standard T.I.M. machine carried by the conductor.

The Pay-As-You-Board bus recently placed in service by the London Passenger Transport Board, to whom we are indebted for this illustration.

Life-Boats in War and Peace

THROUGHOUT the war the life-boat service has continued its magnificent work of rescue, and in the fifth year of the conflict there was as great a variety of work of this kind as ever round the coasts of Great Britain. The story of this service is told in "*The Life-boat Service in War and Peace.*"*

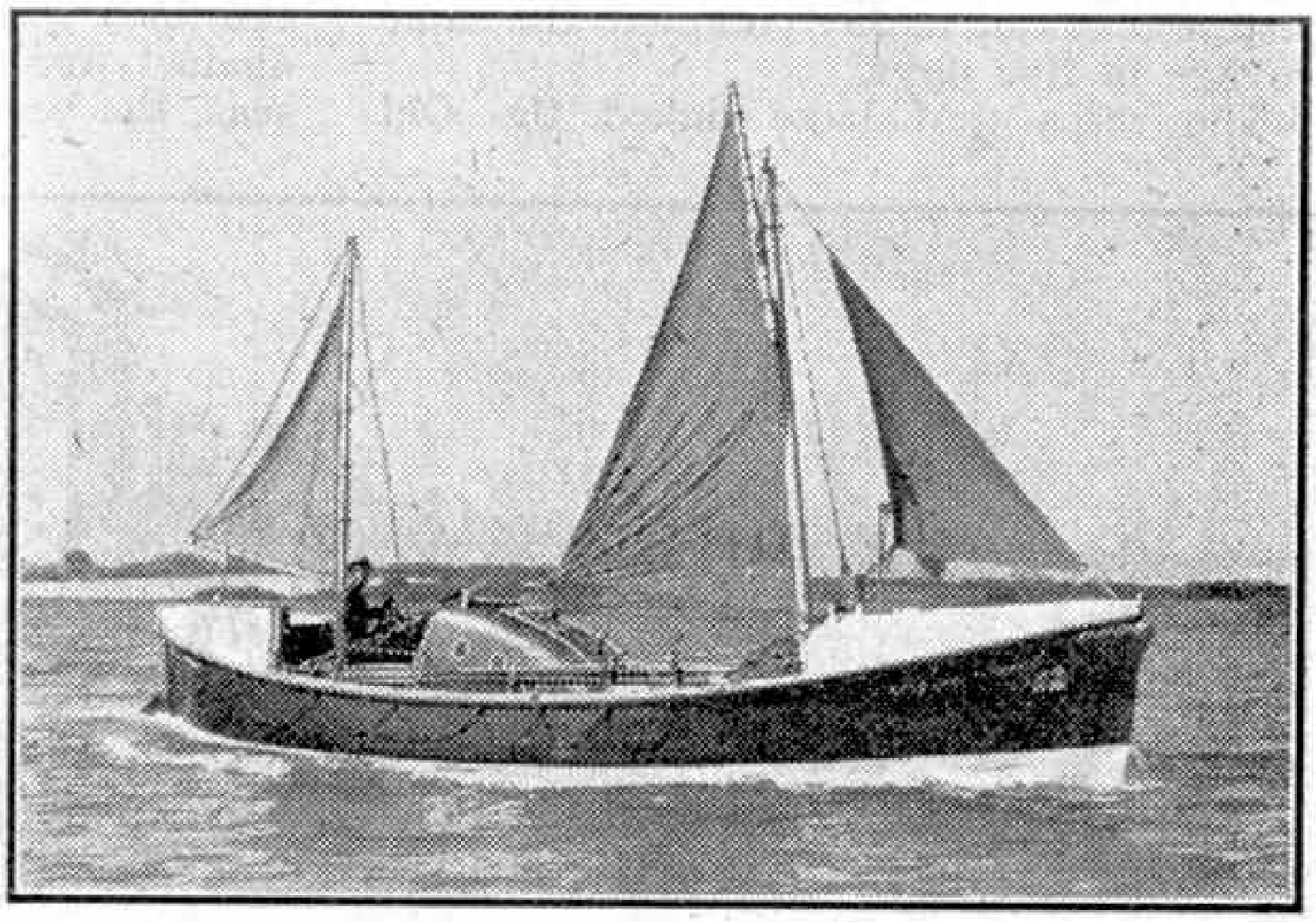
One of the greatest events of the past year was the invasion of Normandy. Life-boats were standing by on D-Day between the Wash and the Bristol Channel, but no call for help came until later, when parts of Mulberry Harbour were being towed across the Channel. Some of the phœnixes, or great caissons of concrete of which the breakwater was built, got into difficulties as they were being towed from Liverpool to Normandy. They were blown up the Bristol Channel by a gale, accompanied by the heaviest seas known for several years, and one broke away from her tugs. The Appledore life-boat set out in search of her and found the 6,000 ton mass rolling heavily, but the crew were safely taken off.

No year goes by without some astounding story of devotion and courage on the part of the life-boat service, and the past 12 months provided an outstanding example. The vessel concerned was a Canadian frigate that had been damaged in the Atlantic and towed 1,000 miles to what was thought a safe anchorage in Swansea Bay. But a few hours later she was signalling for help. A strong gale had sprung up, with fierce squalls of hail, and when the Mumbles life-boat arrived late at night the vessel was lying on Port Talbot bar, so smothered in surf that it was difficult to find her.

The situation was frightful. The life-boat could not go alongside, and it was useless to fire a line and rig a breeches buoy, because the men simply could not have lived as they were being dragged through the surf. All that could be done was to push between the frigate and the shore and circle round the vessel, so that the men on board could jump as the life-boat shaved by. Twelve times this hazardous circle was made in complete darkness, and each time there were a few perilous moments when one or two men could jump from one wildly swinging vessel to the other. All were saved. Of the eight members of the life-boat crew two were over 70 years of age and two others over 60.

As usual, perils from the air had to be encountered on many occasions when rescue work was in progress, and also as usual these were ignored. Thus when the Dungeness life-boat was called to an American steamer that had been hit and set on fire, the crew and the launchers, among them women, hurried to the beach and the life-boat put out although flying bombs were coming in and heavy anti-aircraft fire was being directed at them. Fragments of shells and pieces of flying bombs that had exploded in the air rained down on the shelterless beach during the hours that followed, while the life-boat came and went on its errand of mercy, or stood by until the steamer was out of danger. In the strangest of life-boat rescues of the past year three ambulance men were saved from drowning. An American ambulance at practice on the sands of the Mersey sank in a soft patch, in which a lorry and a repair crane also stuck. The men at work on them were caught by the tide and were taken off by New Brighton life-boatmen only just in time.

Now the war in Europe is over. During its six years 6,373 lives have been saved by the life-boat service, more than in the previous 18 years of peace; seven life-boats have been lost and many others damaged again and again, while only 10 new boats have been placed in service instead of at least 60. Thus the peace brings new problems. The service must not only be kept up, but improved; so plans are now being made for new, safer and more powerful boats, with twin screws and two engines. So far petrol has been used as the fuel, but in future oil is to be used, for Diesel engines can now be made light enough for use in these vessels, large or small. This will obviate the risk of fire, always a danger with petrol engines.



The "Guide of Dunkirk," a modern self-righting life-boat that was finished in 1940, just in time to go to Dunkirk to help in bringing off the British Expeditionary Force. Reproduced from "The Life-boat Service in War and Peace."

New inventions are being pressed into service. One of these is the loud hailer, which replaces the megaphone and allows life-boatmen to speak clearly to those on wrecked ships even in the howling of a gale. A more powerful radio set also has been designed, and great advances have been made in making all equipment waterproof. The latter is a necessity, for a life-boat often has to travel with her decks awash.

The design of the life-boat itself too is being closely studied. It will be a surprise to many readers to learn that not all modern life-boats are self-righting. In the past this desirable feature brought with it certain disadvantages, such as high end boxes and a narrow beam, which made the boats difficult to handle in heavy weather. Many life-boatmen prefer the more stable type, and now a fight is being made, and won inch by inch, to bring back the qualities that had to be sacrificed to make a boat self-righting. It is hoped soon to have life-boats that are self-righting and yet as easy to handle as the other type.

And so the life-boat service goes on. In peace it must remain at full strength, for the chief perils against which it fights continue.

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* "*The Life-boat Service in War and Peace.*" *Royal National Life-boat Institution, Life-boat Depot, Boreham Wood, Hants. Price 1/–, post free.*

Ships that Linked Old and New Worlds

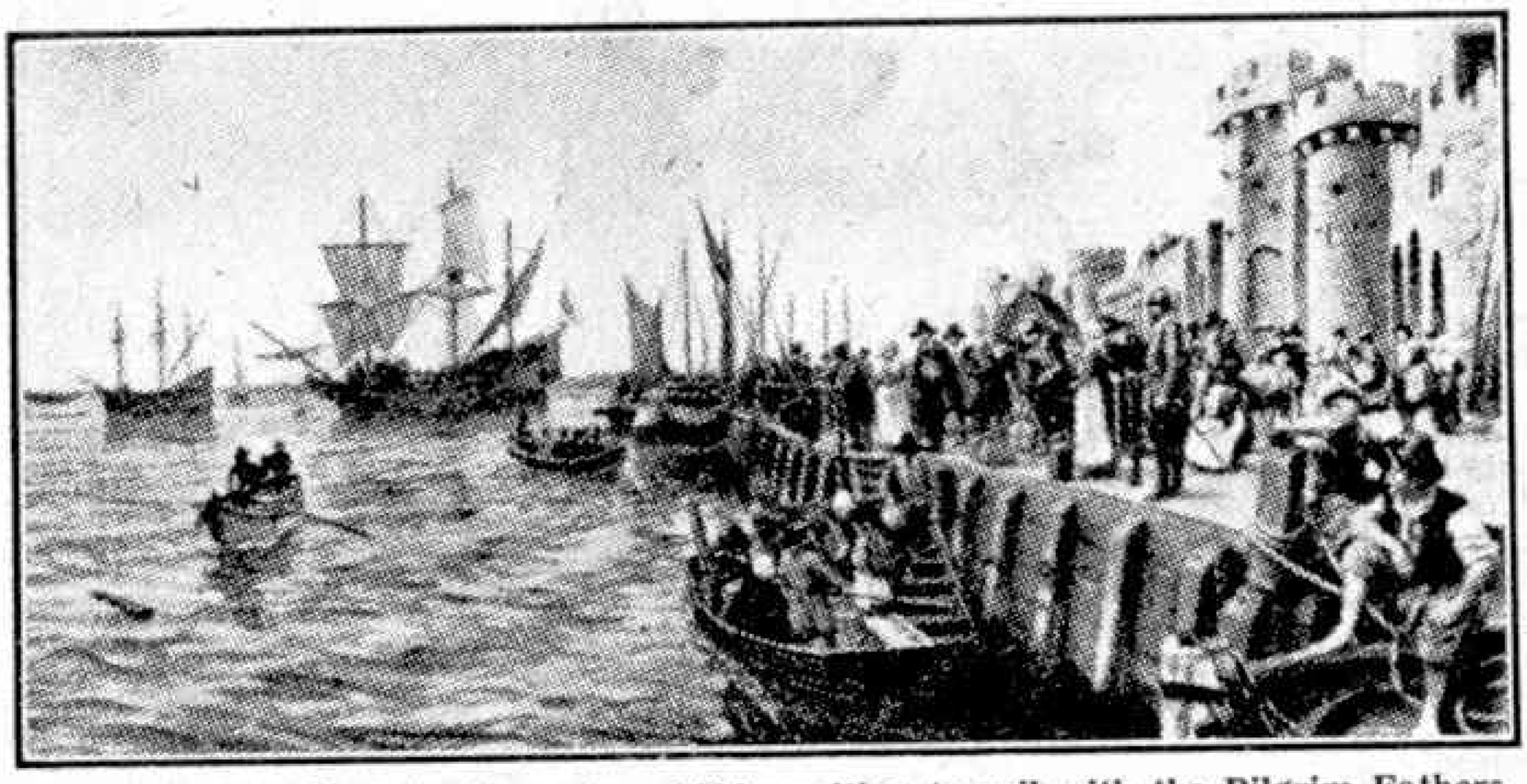
By "Spithead"

THE Atlantic Ocean played the major part in the progressive development of civilisation when ships made neighbours of nations; and during the past 300 years the progress of navigation and ship-building has transformed the Atlantic from a vast uncharted ocean to a mere water-street between the Old and the New Worlds. Where a sailing ship of the sixteenth century took approximately 120 days to sail across the 3,000 miles of sea separating Europe from America, the fastest liners of to-day complete the same voyage in five days.

The ships that have linked the Old World with the New are legion, but the one whose name will be revered as playing a founding part in the bringing together of the Old and the New is the "*Mayflower.*" This little broad-beamed sailing vessel of only 180 tons, with square rig, three masts, and double decks, with the upper structure of the poop deck rising high above the stern, has played a greater part in the history of civilisation than any other ship. She forged the first strong link between the two English-speaking peoples, the United States of America to be, and England; and the example of her adventure was followed by other countries on the Continent of Europe.

The "*Mayflower*" set out for America from Southampton on 15th August 1620. From Southampton's West Quay, in company with the smaller vesssel "*Speedwell,*" she sailed with the Pilgrim Fathers and the Pilgrim Mothers on the first stage of their voyage. A memorial to this episode was unveiled on 15th August 1913, by Dr. Walter Page, the United States Ambassador. Its shape is that of a Greek Ionic cupola capped by a copper model of the "*Mayflower*" serving as a weather vane, and it is erected on the West Quay on approximately the exact site from which the ship sailed.

Summer gales with stress of weather met the two small craft as soon as they sailed from the shelter of Southampton Water and the Solent, past the Needles and into the open waters of the Channel. Battling against strong head winds and short steep seas, the vessels eventually sought shelter in Plymouth. The "*Speedwell,*" proving herself not seaworthy enough to continue the hazardous voyage across the Atlantic, remained in Plymouth and transferred her emigrants to the parent vessel. The "*Mayflower,*" with her company of 102 stalwart Pilgrims, 78 men and 24 women, set sail from the Barbican on 5th September. After a terrible voyage lasting 107 days she made a forced landing on 21st December on the coast of Massachusetts.

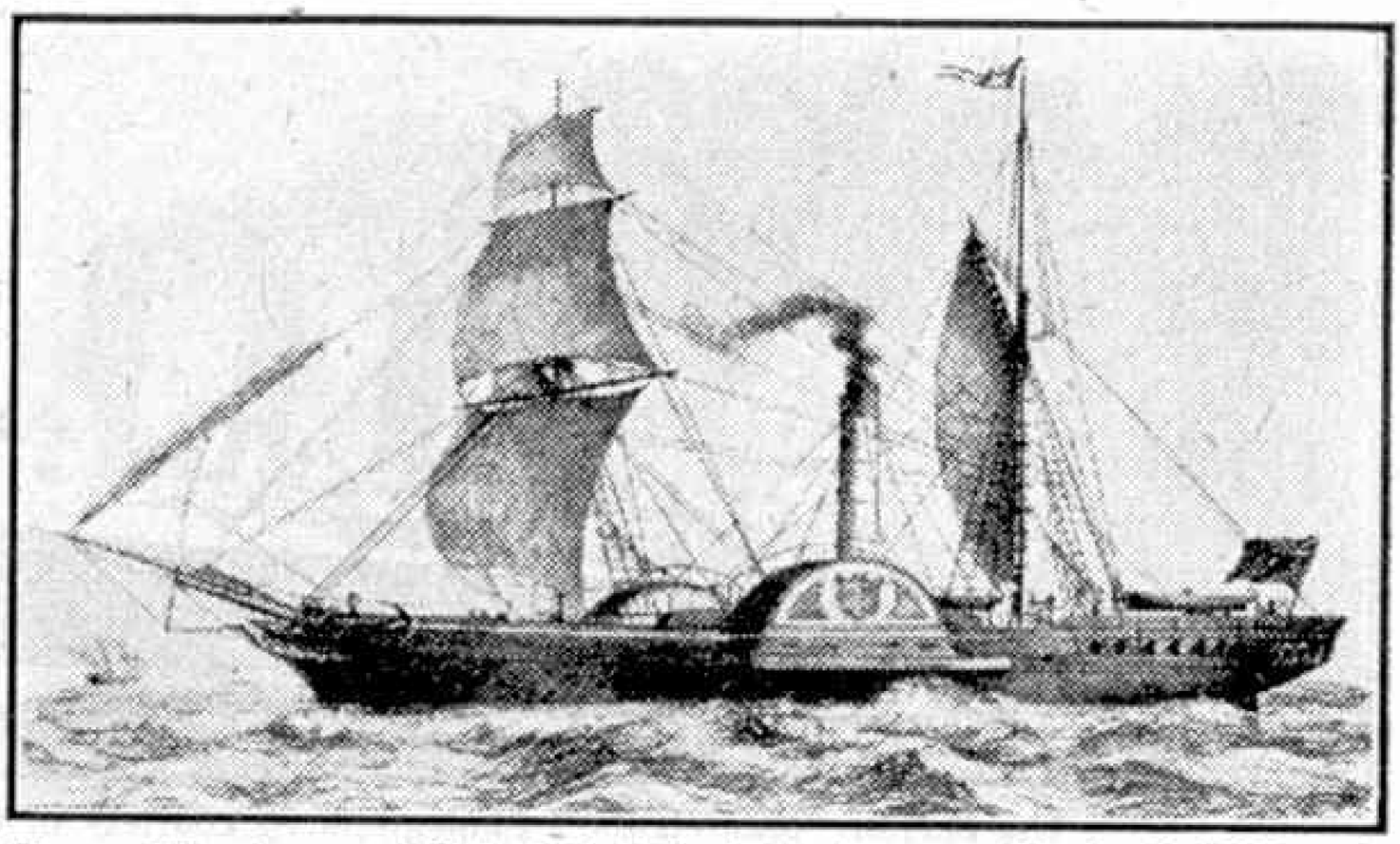


The "Mayflower" at Southampton, 1620, waiting to sail with the Pilgrim Fathers. Photograph by courtesy of the Pilgrim Society.

Another romantic link between the Old and the New Worlds was the voyage of the two small sailing ships "*Ark*" and "*Dove*" from Cowes, the Isle of Wight port in the Solent about 10 miles from Southampton. These little vessels started from Cowes Roads on 22nd November 1633, thirteen years after the Pilgrim Fathers had left, and carried the first British settlers to Maryland. There is a bronze plaque let into the terrace wall of Sally Port at the eastern end of the Cowes Parade that commemorates the sailing of the "*Ark*" and the "*Dove,*" and is the gift of the Ark and Dove Society, Baltimore, Maryland. Lord Fairfax, a direct descendant of the first settlers in Maryland, dedicated and unveiled the plaque on 22nd November 1933, in the presence of the United States Ambassador and Sir Timothy Eden, whose forebears

were also among the families who founded the New England State. Maryland, the name they chose to give their new home, was in honour of Maria, wife of Charles I, who granted the first charter.

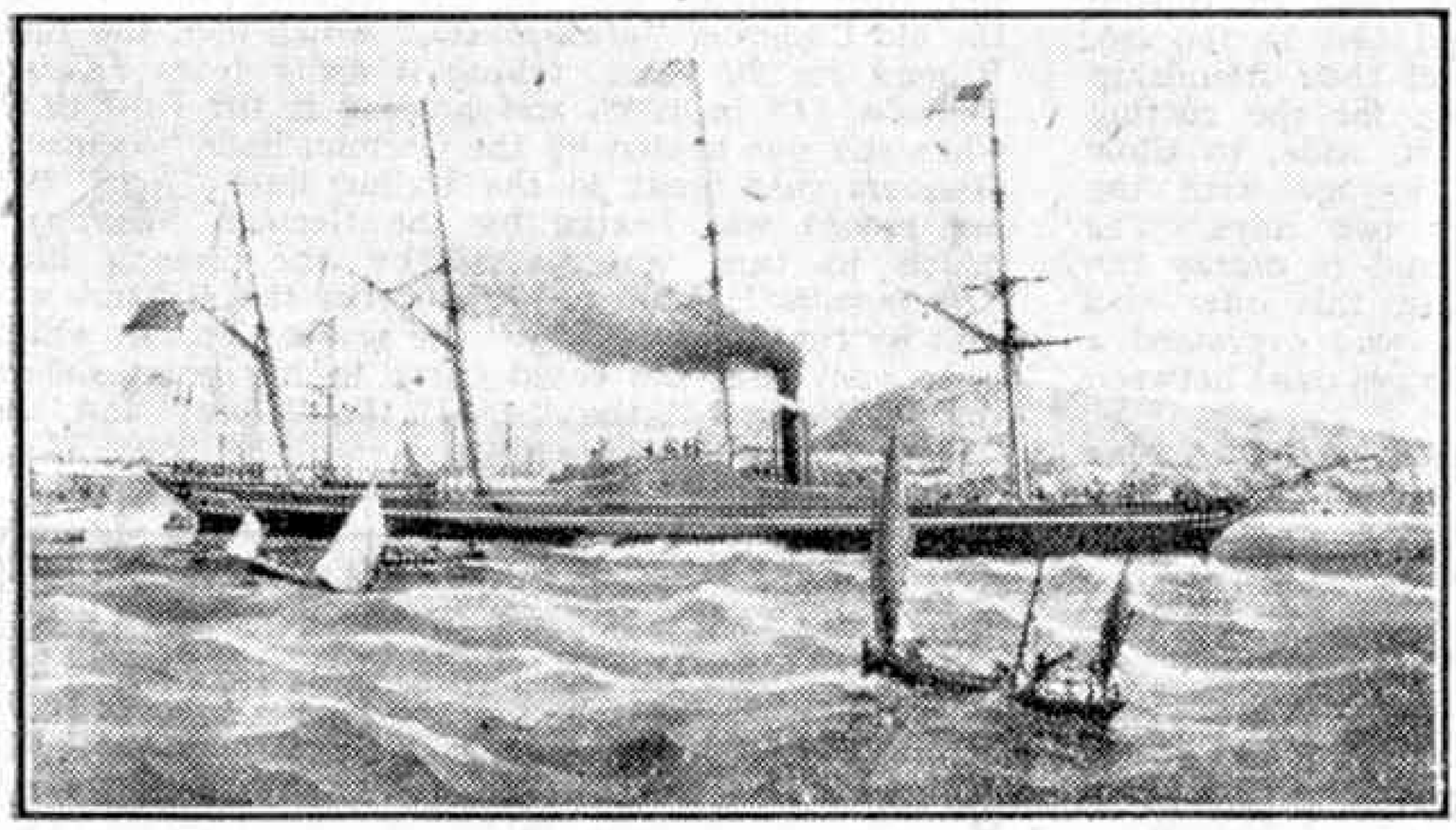
Littlehampton, a tiny port on the West Sussex coast, some 12 miles eastward from Cowes as the crow flies, also played an important part in this bringing together of the Old and the New Worlds. At the back of this port, in typically English countryside, William Penn, the Quaker, spent his youthful years, though he was born in London. He was a rugged, independent character, with views on religion at variance with the National Church; and was expelled from Christchurch College, Oxford, and imprisoned three times for his beliefs, serving one sentence of nine months in the Tower of London. His father's influence with Charles II, a friendship founded upon a debt of £15,000 owed to Admiral Penn, eventually gained young William his liberty. He founded a Quaker House at an old farm near Coolham, the actual meeting place being called the Blue Idol, a name suggested by a figure-head on one of his father's ships.



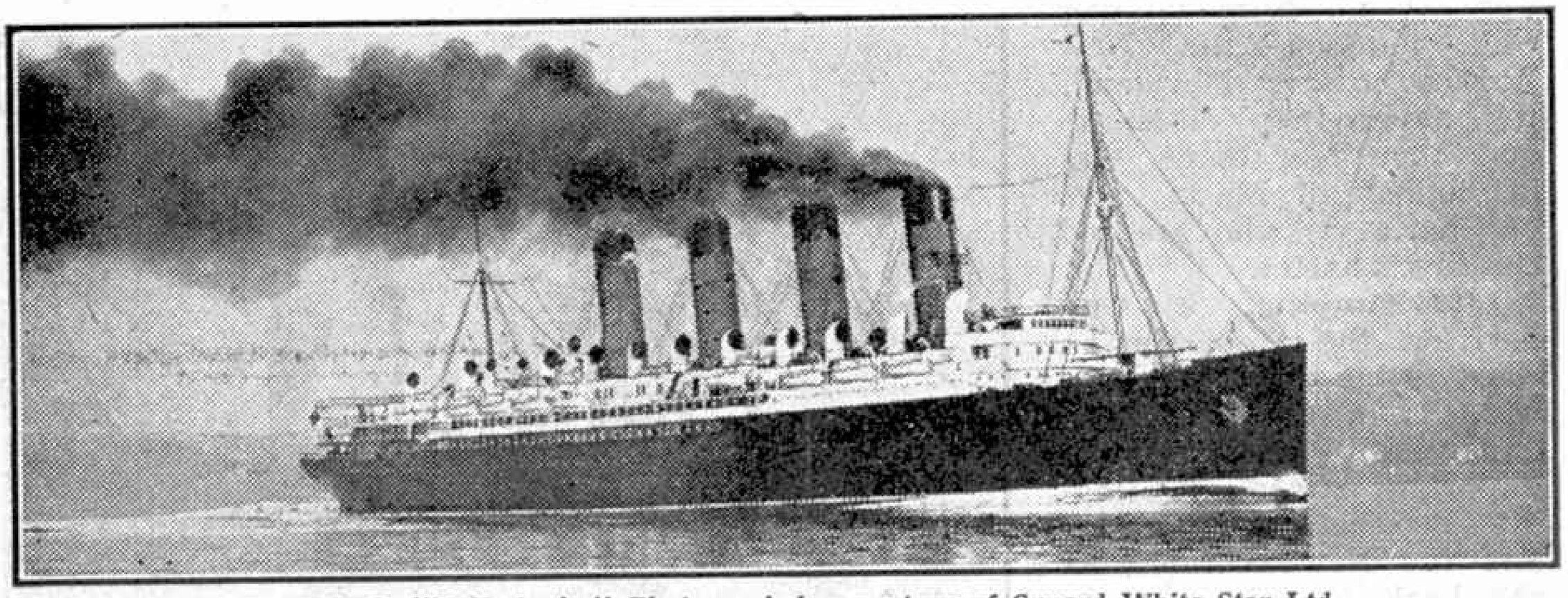
The paddle steamer "Sirius" left Cork harbour on 4th April 1838 and arrived at New York on 23rd April. From a lithograph in the Science Museum, South Kensington, London.

It was in this Sussex village that William Penn first dreamed of sailing to America to found a Quaker colony, and actually set sail to cross the Atlantic in 1682 in a 300-ton ship. The voyage took 70 days and was one of great hardship, during which a third of the 100 would-be colonists died. In America Penn and his faithful followers took over a large tract of virgin forest land, naming it Sylvania. More friendly disposed towards the young Quaker, and no doubt with an eye on business, Charles II offered Penn the land in discharge of his father's £15,000 debt. Penn accepted it gladly, and the present prosperous Pennsylvania was founded.

Since those far-off days the Atlantic has become a speed track for ocean liners. The nations of the United States, France, Germany, Holland, Italy and Britain have spent more than £50,000,000 in quest of the Blue Riband for the fastest passage on the East and West crossings. It took nearly 200 years before anything like an organised regular passenger route was established. The Black Ball Line, founded in New York in the early years of the 19th century, was the first to make anything like regular voyages, with its fleet of fast sailing clippers, and an average of 30 days was taken to do the journey from New York to Liverpool. In the early 19th century shipbuilders among both the English-speaking peoples were daring enough to experiment in steam-driven vessels. In 1807 Fulton was making tests with a steamer named *"Clermont"* on the Hudson River, while a few years later,



The "Great Western" made the Atlantic crossing at the same time as the "Sirius," arriving only a few hours after that vessel. From a lithograph in the Science Museum, South Kensington, London.



The R.M.S. "Mauretania." Photograph by courtesy of Cunard White Star Ltd.

on the River Clyde, came the first voyages of Bell's steam-driven "*Comet.*"

Prior to 1833 some vessels had begun to use the steam engine as an auxiliary in crossing the Atlantic, though relying mostly upon sail. But in that year the "*Royal William,*" a Canadian-built vessel, was the first to cross almost entirely under steam power, and laid the foundations of the great Atlantic ferry service we know to-day. The "*Royal William*" was built by subscriptions totalling £16,000, and heading the list of 144 subscribers was the name of Samuel Cunard, who a few years afterwards formed the famous Cunard Line.

Although voyages were made under steam by the paddle vessels "*Great Western*" and "*Sirius*" subsequent to the "*Royal William,*" no actual regular service was established until 1840. The pioneer Cunarder "*Britannia*" initiated a regular ferry service between Liverpool and New York, and incidentally set sail on her maiden voyage on 4th July, on the 64th anniversary of the Declaration of American Independence.

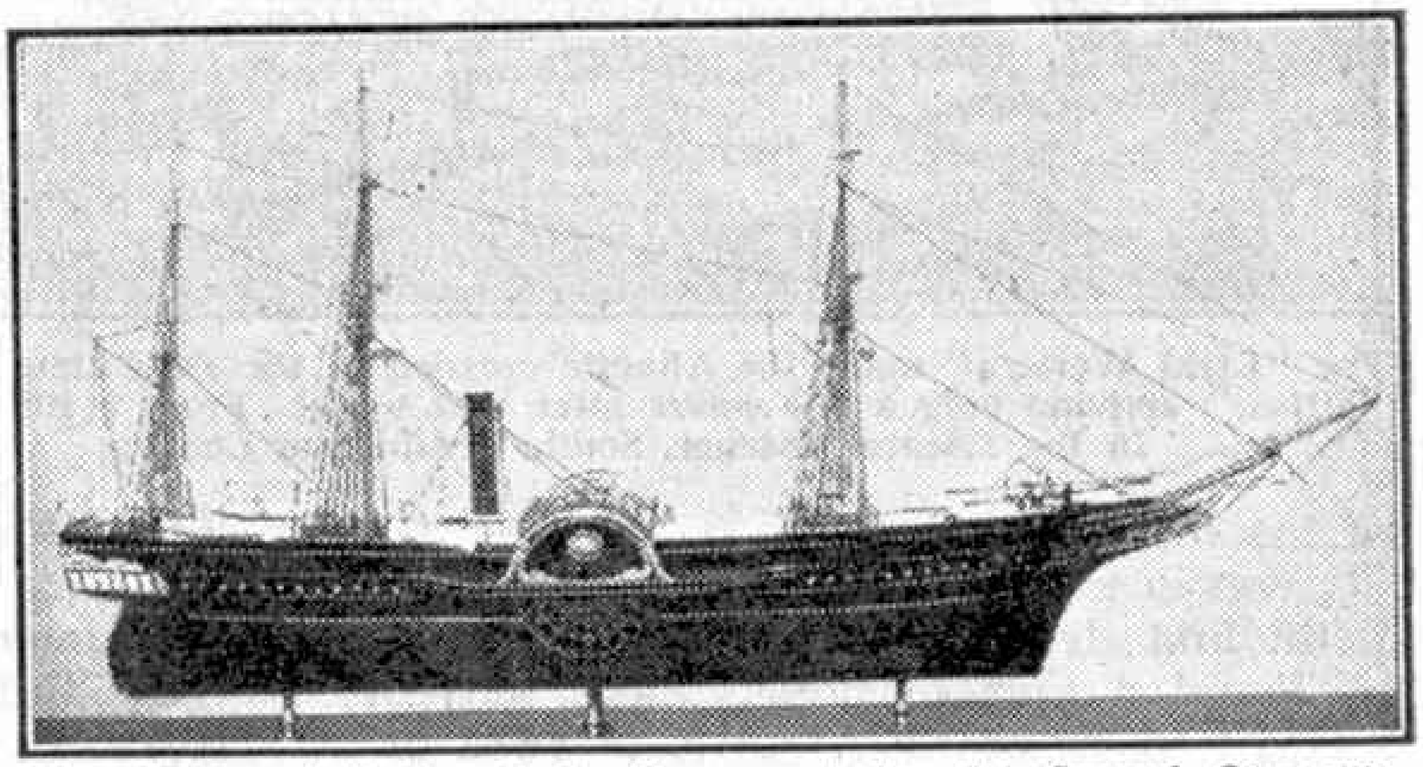
The "*Britannia*" was also a symbol of goodwill between the American and British peoples. In the winter of 1844, during the great frost in Boston harbour, the "*Britannia*" was held fast in the ice. The merchants of Boston expressed their friendship in a practical way by subscribing for the cutting in the ice of a 7-mile canal, 100 ft. wide, to allow "*Britannia*" to proceed on her voyage with the mails, which she could do after two days. The British Post Office, it is said, offered to defray the expenses of cutting the canal, but this offer was refused by the Boston merchants, who expressed a desire that good relations should always exist between the two nations.

United States shipowners founded the Collins Line in 1846. Their wooden steamships were the first to have straight stems, and being of nearly 3,000 tons each, were in advance of anything yet known in the Atlantic transport service.

In 1850 came the beginning of another famous shipping line, the Inman Line, sailing between Liverpool and Philadelphia, and a rival of Samuel Cunard's ships. The steamers of the Inman Line were named after cities, the first two being the "*City of Glasgow*" and the "*City of Manchester,*" the former sailed from Liverpool in December 1850 to Philadelphia. The best known of the Inman Line was the "*City of Washington,*" which was put on the Liverpool to New York run in 1856; but the fastest was the "*City of Paris*" which held the Blue Riband of the Atlantic for five years, first wresting it from the Cunarder "*Scotia*" in 1866. It was during this period that international competition rose between rival countries, and the first German liner, the Nord-Deutscher Lloyd "*Bremen,*" started on her maiden voyage in June 1858. During this period liners changed from paddles to screws, and were built of iron instead of wood.

The first steamer to hoist the White Star Line house flag was the "*Oceanic,*" which sailed on her maiden voyage from Liverpool to New York in March 1871; and in 1876 this line won the Blue Riband with the "*Germanic,*" and again in 1891 with the "*Teutonic.*" The most famous ship of the line, however, was the "*Olympic,*" one of the most popular in the Atlantic service, which left Southampton on her first voyage in 1911.

With the early nineties came the big liners, and the entry into the Atlantic service of France and Italy, and more seriously Germany. In 1897 the "*Kaiser Wilhelm der Grosse*" of 14,000 tons won the Blue Riband for Germany and started intense rivalry for this speed trophy of the Atlantic between Italy, France, Germany and Britain, each of which captured it only to lose it again. From this period onward the most famous liner in the Atlantic service was the old Cunarder "*Mauretania,*" which held the Blue Riband for 20 years, taking it away from "*Kaiser Wilhelm II*" in 1909, and holding it till July 1929, when she was beaten by the German liner "*Bremen.*" Honours then went to the Italian liner "*Rex,*" but her record was beaten by the German "*Europa,*" which in turn was passed by the French liner "*Normandie.*" After a few months the Riband was won by the "*Queen Mary,*" the present holder, which is so vast that she could carry in her great saloon the "*Mayflower,*" the "*Ark,*" the "*Dove*" and the "*Santa Maria*" of Columbus.



The "Britannia," the first ship owned by the Cunard Company. From a model in the Science Museum, South Kensington, London.

Engineering Notes

A Fine Precision Hobbing Machine

The great turbine propulsion units installed in many modern ships run at speeds far too high to allow them to be coupled direct to the propeller shafts, and their drive has to be transmitted through large reduction gears and pinions. As these gears have to cope with tremendous power and must run silently and without setting up vibration, they have to be made with great precision, and their manufacture demands engineering skill and machine tools of the very finest quality.

One of the latest precision hobbing machines made available for producing such gears is illustrated on this page. It was manufactured by Muir Machine Tools Ltd., and is installed in the main engine shop of a shipyard on the north-east coast.

The machine is 16 ft. in height and 9 ft. in width and weighs over 60 tons. It is capable of producing pinions and gears from 36 in. to 150 in. in diameter, and has a maximum hobbing or tooth cutting width of 72 in. All its essential hobbing gears, and the drives to the hobbing shaft, slides and worktable, were made with the greatest possible precision in temperature-controlled rooms, and after the machine was completed it was subjected to severe precision tests through which it passed with flying colours.

It will be seen from the illustration that all the main parts of the machine are of massive proportions, which give it a high degree of rigidity, a quality most important in a machine of this kind.

The worktable has a bore of 24 in. diameter to facilitate the cutting of wheels after they are mounted on their shafts, which is desirable in order to obtain the necessary high accuracy, and is unavoidable with the built-up wheels in general use for marine propulsion.

Electric Lift inside 400 ft. Chimney

An electric passenger hoist running up its centre is to be a feature of a great new chimney to be built at the Hams Hall electric power station, Birmingham. This chimney will rise 400 ft. above ground level and have an internal diameter of 22 ft. at the top, which is about the width of an average suburban road! There is already a similar chimney at this power station, and the new one will be identical in every respect. The two chimneys will stand on a reinforced concrete raft 75 ft. square and 9 ft. thick, and the deadweight on the subsoil will be about 10,000 tons without including wind load.

About 2,000,000 bricks will be used in building the chimney, and the work, which is to be carried out by P. C. Richardson and Co. (Middlesbrough) Ltd., will occupy about 18 months. The total cost excluding the foundations, will be about £50,000. This firm have already erected at various sites throughout the country 20 other chimneys all having a height of 300 ft. or more.

An Old Steamer Runs Aground

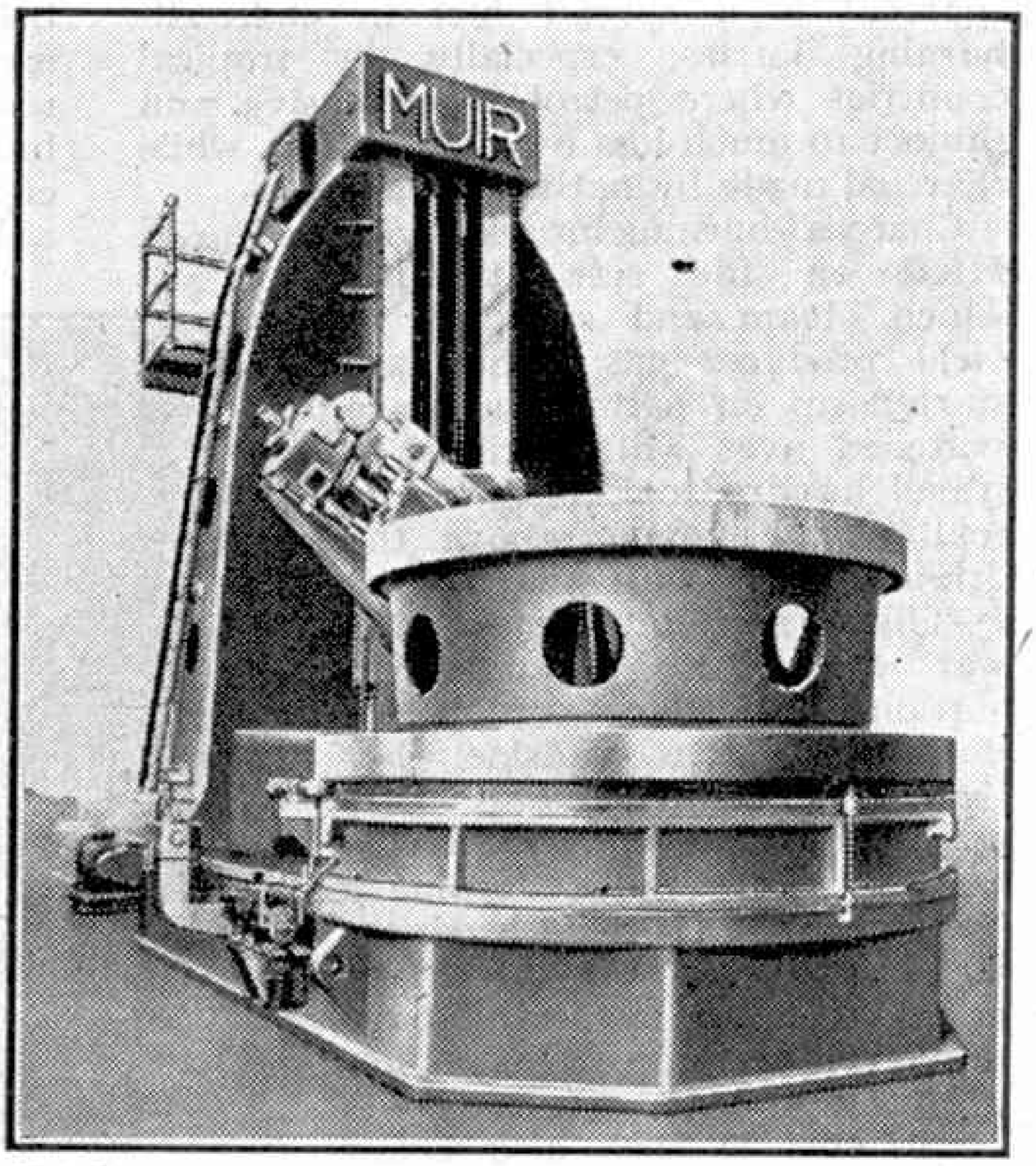
The steamship "*John*," probably the oldest steamer in the world still in service, recently ran aground in the River Severn and now is fast ashore on the rocks. The "*John*," which is owned by a Bristol firm, was built in 1849 and has spent most of its life trading between the Bristol Channel ports.

* * * *

Work is to be resumed on the traffic light installation at the Bank, London, which had to be suspended owing to the war. This intersection probably is the busiest in the City of London.

Crew of a Liberty Ship Rescued

The Royal National Life-boat Institution has awarded its thanks on vellum to Coxswain Matthew Lethbridge, and his brother, Second-coxswain James Lethbridge, of the life-boat at St. Mary's, Isles of Scilly, for their fine navigation in finding and rescuing the crew of 15 of an American Liberty ship, which had been damaged and was drifting helplessly. They took the life-boat on a very hazardous journey of nine miles round the islands on a very dark night, in a gale with very heavy seas and without lights or marks to guide them. The Institution has also made a money reward to coxswain, crew and helpers. The coxswain won the silver medal and the second-coxswain the bronze medal 17 years ago.



The Muir hobbing machine described on this page actually cutting a spur ring for calibration as a test of the machine's accuracy. Photograph by courtesy of Muir Machine Tools Ltd.

Luxury Cars of the Future

Luxury cars of the future may be fitted with an intricate device that will make riding over the roughest roads really comfortable. This device, which is called a gyro-stabiliser, is now being used in military tanks to make possible accurate aiming of their guns as the tanks move over rough ground. At present the apparatus is rather complicated, but future research and development may make its use in motor cars and even trains, a practical possibility.

In its present form the apparatus comprises a piston working in a cylinder attached to the gun breech, and which moves up or down to stabilise the gun's elevation. The piston is moved by oil fed into the cylinder under pressure. The amount of oil pumped into either end of the cylinder is determined by two electro-magnetic valves operated through a voltage control device, which in turn is controlled by a gyro fixed to the gun breech.

Modern Charcoal-Making

A New Phase of an Old Industry

By M. Schofield

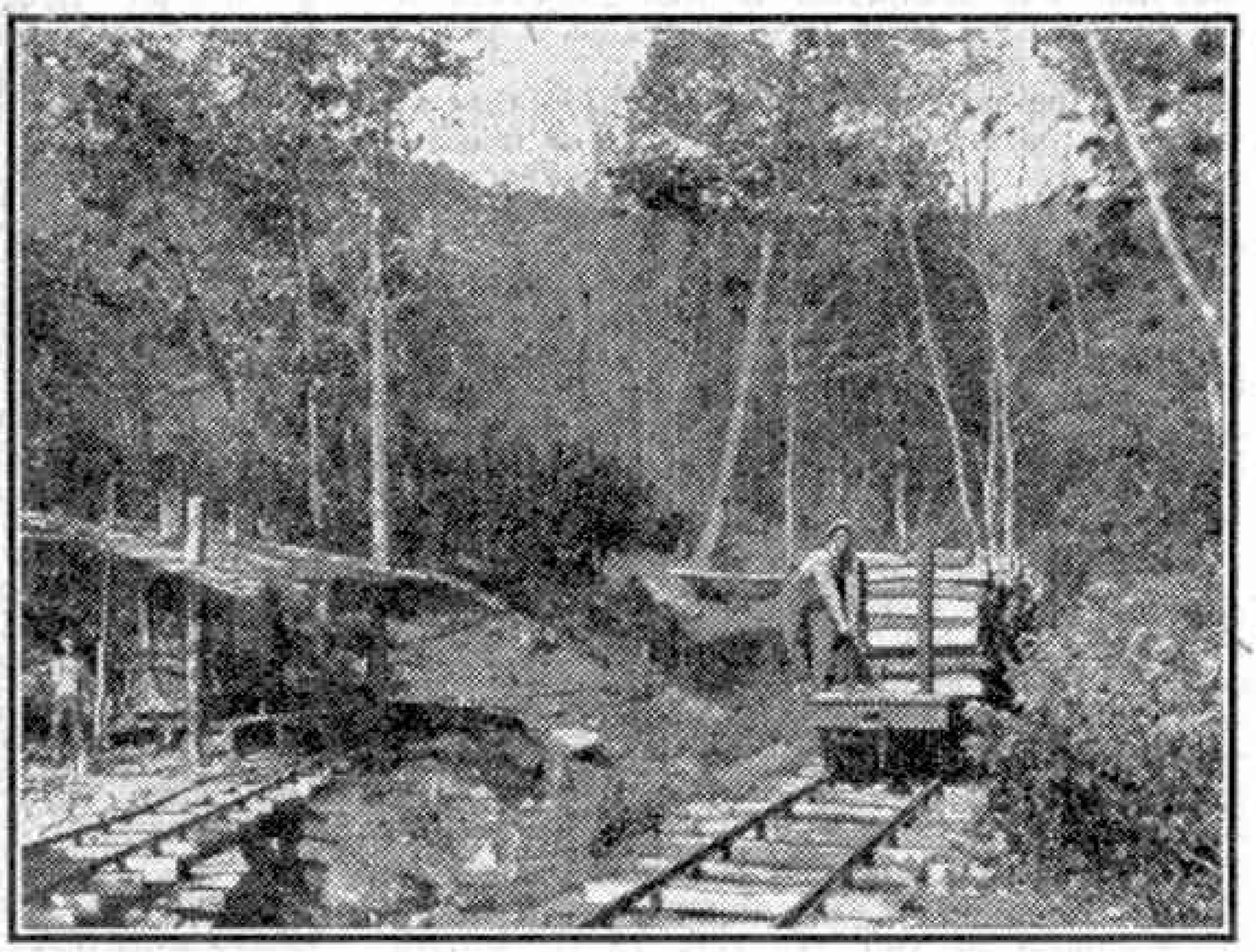
CHARCOAL, the oldest of black pigments used in ancient Egypt, has found a vast number of uses both in treating metals and because of its highly porous nature. It is an essential in some branches of the steel industry, in gold and silver refining and in melting and converting other metals. The old charcoal iron has gone from the kitchen, but charcoal is a special fuel in charcoal-burning lorries, especially in tropical countries where petrol is expensive and subject to much loss by evaporation, while charcoal made by natives is cheap.

Charcoal-burning lorries have a producer, fitted on the side, through which steam and air pass to yield producer gas. They are started up on petrol, but once switched over will continue to travel hundreds of miles before refilling the hopper above the driving cabin with charcoal at a filling station. Before the war France had many such stations in place of petrol pumps by the roadside, her "gazogene" lorries and cars competing in severe road trials. One advantage in ordinary traffic is that the side producer is very hot, so that the driver is not troubled by errand boys on bicycles leaning on his vehicle at traffic signals!

Charcoal is used also below golf greens to lighten heavy soil and render it porous. It finds its way into charcoal biscuits, for which no points are required! And when its pores are "opened out" or rendered "active," this absorbent charcoal goes into gas masks and into purifying plants for sugar and glycerine.

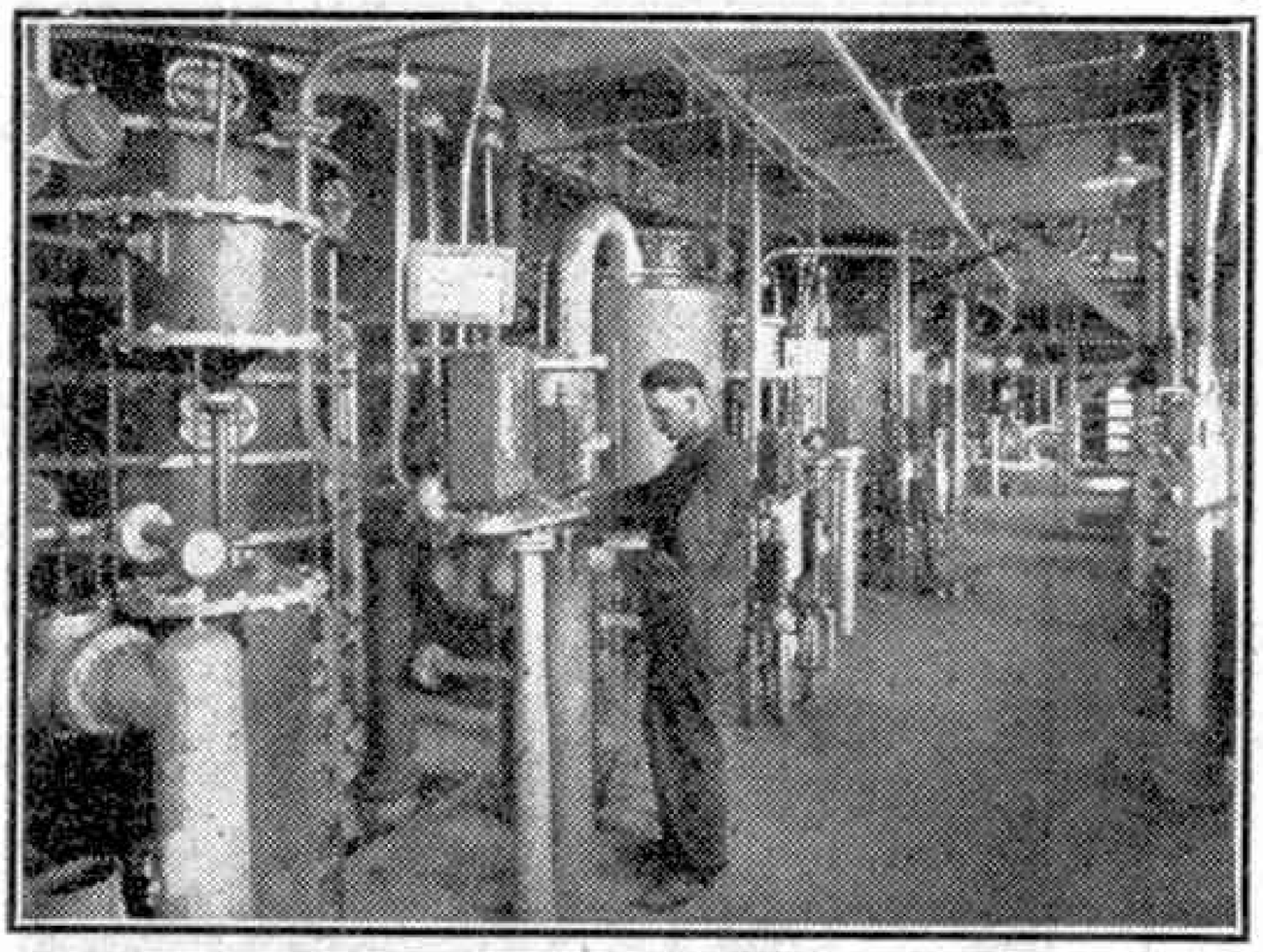
With all such increasing uses it is not surprising that improved methods of manufacture are now seen, all of which of course use the oldest of raw materials, wood waste. The timber dealer takes the best part of the tree; the charcoal-maker is quite content with the odd billets, slabs and branches left over, since these form charcoal equally well. The first method suggesting itself is to pile the forest waste in heaps or "meilers," cover it with a turf layer with air holes, and set these heaps alight. That is what the old charcoal-burner did right up to this war, although faced by competition from more up-to-date methods. He had no capital to expend; a clearing in the forest and forest waste were all he required.

The charcoal-burner who found the body of William Rufus in history was merely one of thousands who lived this nomad life, watching and dozing by their burning wood piles until, after seven or eight days and nights, the mass was ready to be quenched with water and the charcoal sent off to market. Thousands of charcoal-burners roamed what was once extensive forest land in Britain, providing fuel for the many "itinerant forges" set up in the forest to smelt British iron



Lumber is the raw material of the charcoal industry, for which the odd pieces and remnants are used. The illustrations to this article are reproduced by courtesy of Kodak Ltd.

Next came portable kilns looking like huge garden incinerators, with five smoke stacks fitted, with improved draught and control over the carbonisation. Wood must be fully charred; but it must not be allowed to burn completely away to gases and vapours. The French with their extensive forests were expert with such kilns, providing fuel for their "Gazogenes." When the tell-tale blue smoke rises from



In the Kodak charcoal works the wood is distilled to yield not only charcoal but also wood alcohol and other products, which are then refined by further distillation.

the central smoke stack, the incinerator has a lid placed on it, the smoke stacks are removed, and the charcoal is allowed to cool before withdrawing it into air.

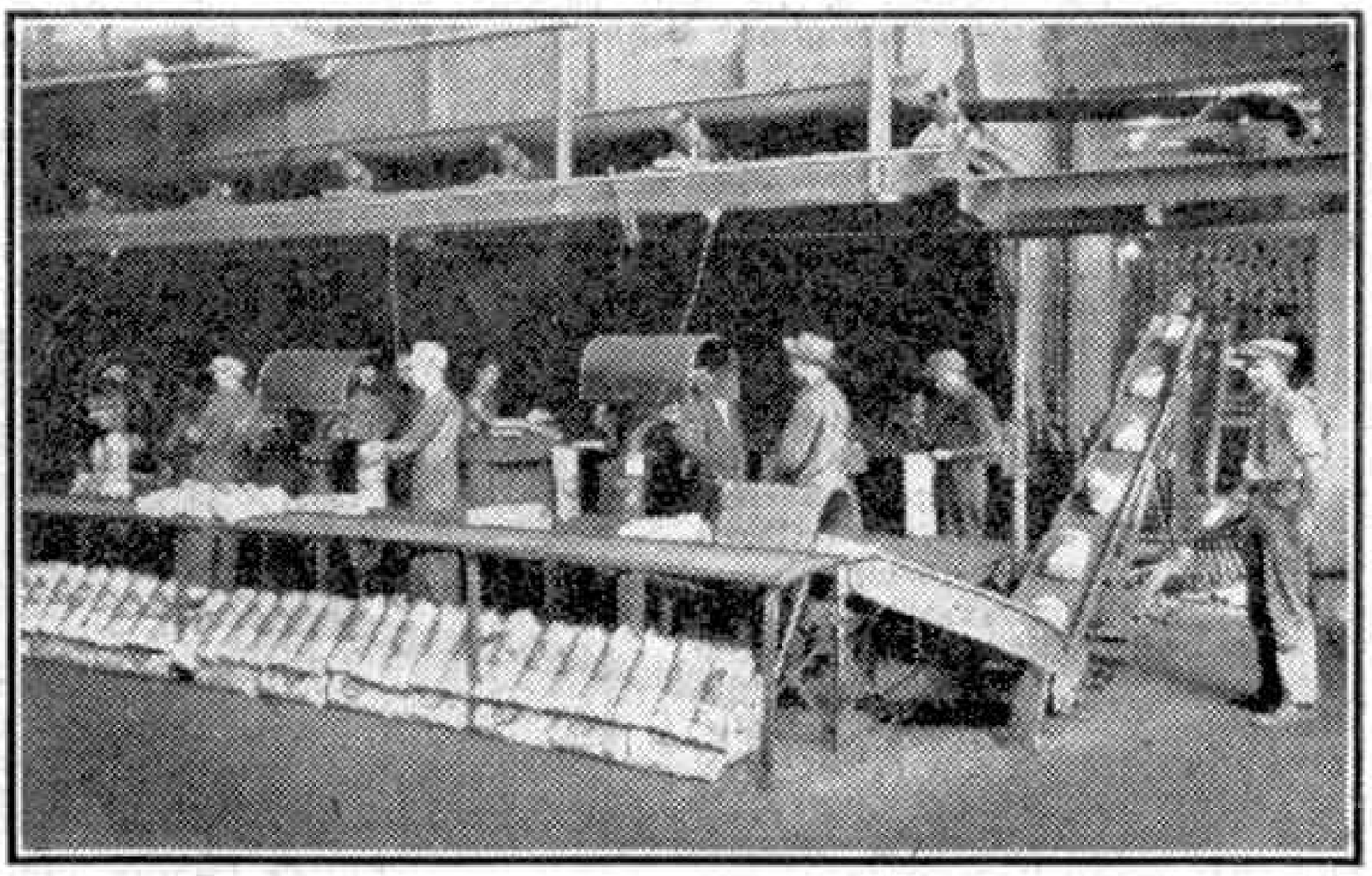
If charcoal were the only product obtained from wood, this method would be all that is required. Yet the old Egyptians knew of wood tar oozing from the carbonising of wood when combustion was not too strong. They preserved dead bodies in it. And eventually a great chemical industry arose, yielding not only wood tar but "wood spirit," or methyl alcohol, used in "methylating" spirit, acetone for use as a solvent and in making cordite, acetic acid, which is present in vinegar, and many other chemical products. For making these wood was carbonised in retorts fitted with condensers for collecting the valuable chemicals. At first these condensers were zig-zag pipes surrounded by tanks of water, and close by the Wrekin in Shropshire a ruined charcoal factory can still be seen with such zig-zag pipes rusting in cooling "boxes" through which the mountain stream still runs.

Later came the great ovens called "Jumbos" because of their size, these holding 20 tons of wood charged into the ovens in steel lattice cars. Such modern factories can be seen at Worksop, on the borders of Sherwood Forest, deep in the Forest of Dean, near Speech House Road, and at one or two other places, reminding us that Britain still has some wood waste to dispose of despite our depleted woods and forests. After 24 hours the great oven retorts are discharged. It is a spectacular sight to watch this. The huge "storm" doors are swung back and the inner doors of steel opened, and after a workman has dodged the first rush of flame and connected a steel hawser to the first car, all four cars are hauled blazing from the Jumbo. As soon as possible the cars are run into long tunnel-shaped coolers, where they are sealed off so that the charcoal does not burn away. A fresh run of four cars on a side line is then run into the hot oven and another 24 hours distillation begins.

America and Canada with their vast timber resources would be expected to go yet further. Whereas a British charcoal factory has to be content with four Jumbos, American factories have up to 20 or even more. It is not for charcoal only that such great works have been built, but rather for chemical products refined to a pure form. Thus the Kodak Company, after selecting timber for their box Brownies, film spools, packing cases, etc., carbonise the rest of the forest raw material in a very modern factory to yield acetone, wood alcohol and other products necessary for making "non-flam" film and finishes for their cameras.

Is this the final type of factory beyond which the making of charcoal will never progress? Mr. Henry Ford thinks not, for at the Ford Works are installed retorts that require no

(*Continued on page 250*)



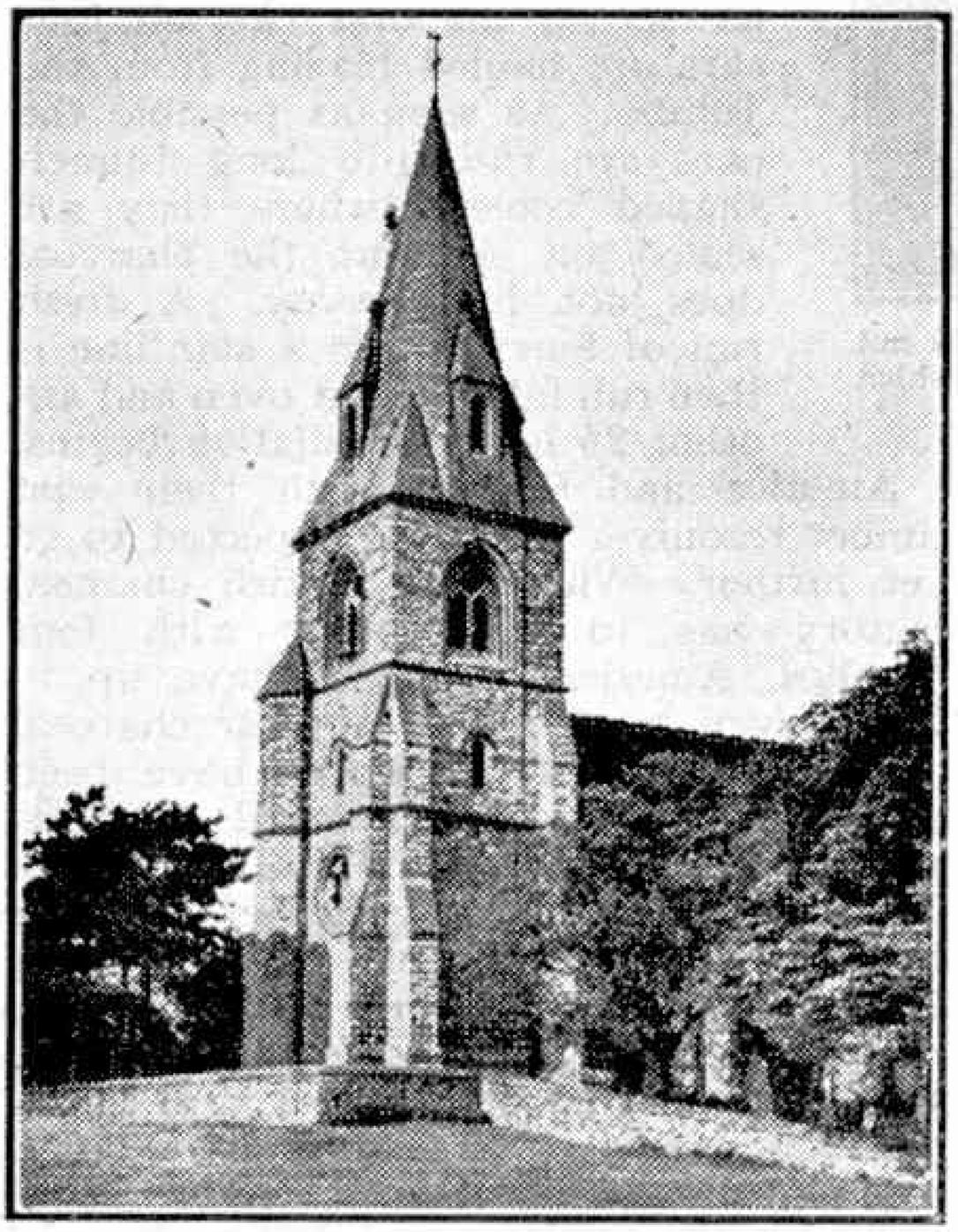
Packing charcoal into bags, which are carried into store by conveyor.

Photography

Village Churches

By E. E. Steele

IN the May "*M.M.*" I wrote of the interest and fun of taking photographs of old thatched cottages, still common in the villages of most counties. While on the look out for these cottages it is an added interest to take pictures of some of the old village churches, of which we have such a rich heritage.

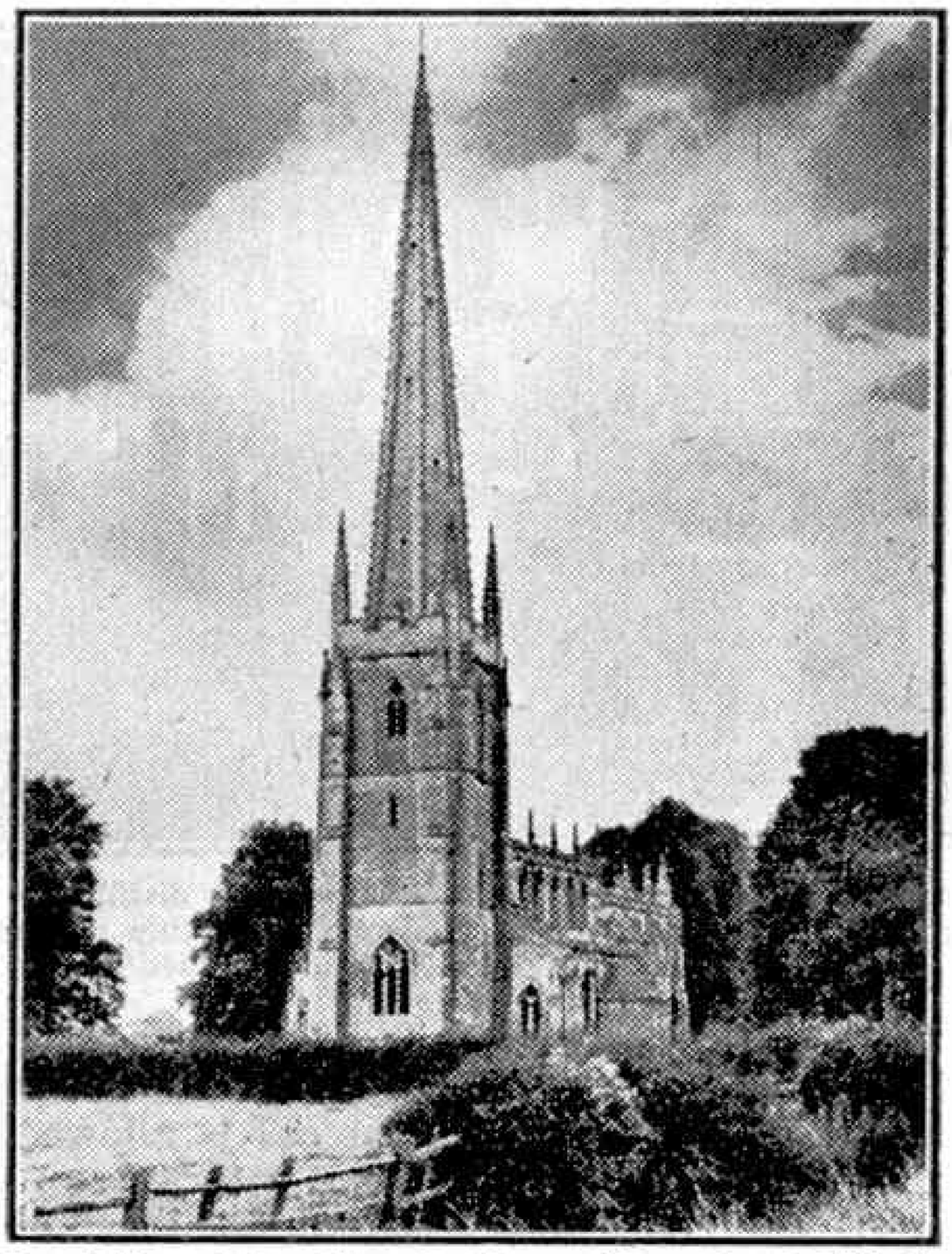


Aisthorpe Church, Lincs.

The history of some churches can be traced back several centuries, and the craftsmanship of those old stonemasons is a wonder to behold. Church architecture sounds as dull as ditch-water, but it can be really fascinating when you get to know just a little of the various styles and periods which succeeded each other throughout the centuries.

Begin with your own village church, or the one that is nearest, as I did with our church at Fiskerton. This church has five different styles of architecture, owing to the fact that it has been restored at various times during its long life, and at each restoration the type of architecture prevailing at the time has been incorporated. This is typical of most old churches, for after all a church cannot last all these hundreds of years without a certain amount of re-building.

Use a good guide book. Instead of a pointless outing to nowhere in particular, your local guide will help you to plan a really interesting day, in which you may be able to bag quite a number of good churches. It is a curious fact that many interesting groups



Brant Broughton Church, Lincs. The spire is 170 ft. high.

of churches are often to be found within an area of a few square miles. When holidays or other occasions take you farther afield to other counties, remember to take your camera with you to make pictures of churches you may be unlikely to visit again. Collecting churches by means of photography is indeed a good hobby, and one that can become very valuable as your collection grows through the years.

Before actually photographing your chosen church try to examine it from various angles in order to find the best viewpoint with regard to lighting, etc. Details always show up better with side lighting than with the sun behind your back. If clouds are present it is a good plan to make use of them by placing a yellow filter in front of the lens and increasing the exposure two or three times. In the case of tall spires it may be necessary to get back quite a long way in order to include the top of the spire without tilting your camera. Somehow the tapering spire seems the most attractive part of the church. See that foreground objects do not obstruct the view.

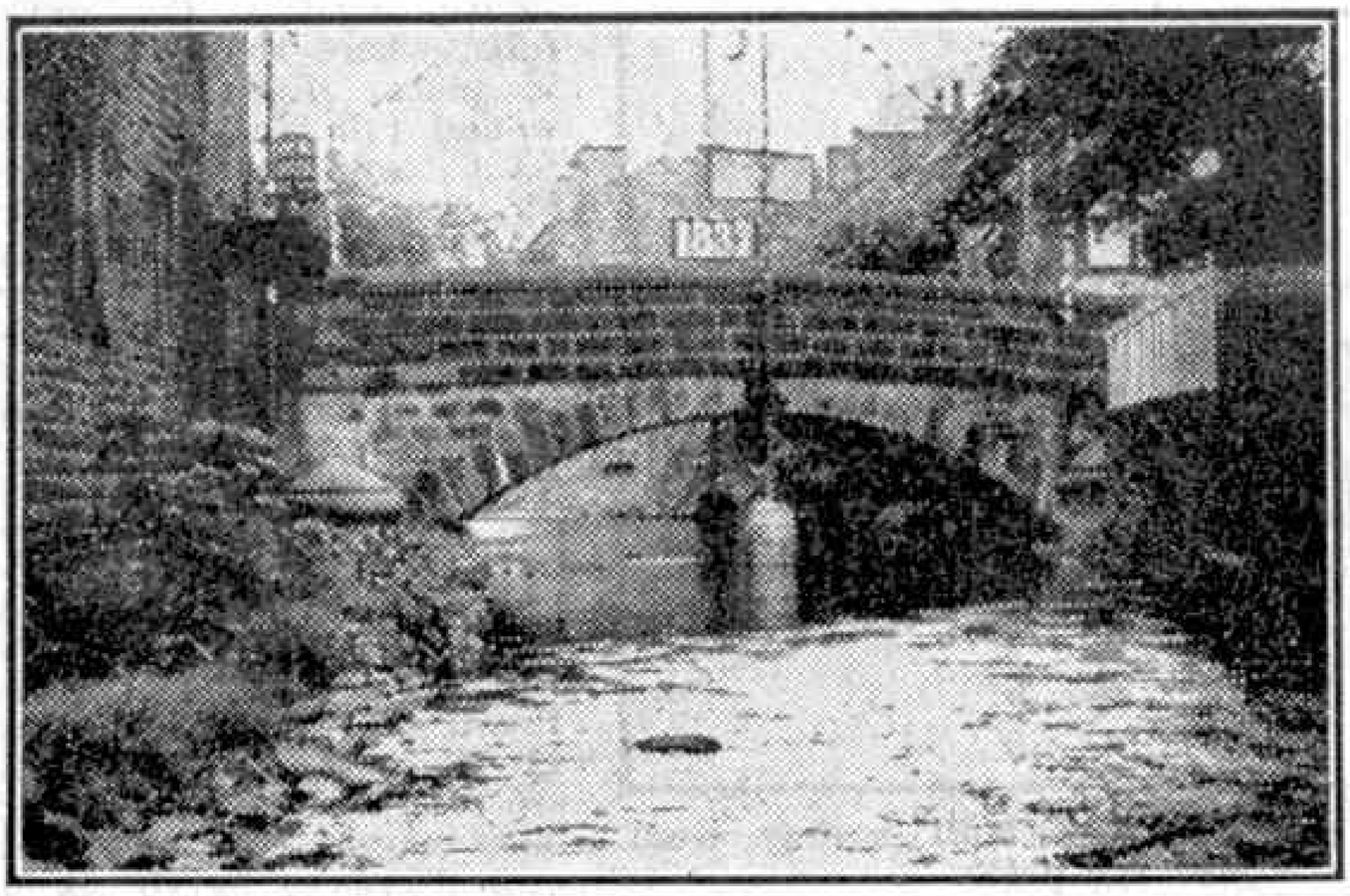
Village Church and Manor House, Fiskerton, Lincs.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

INDIAN HOLIDAYS

During my stay in India I spent some time in the Darjeeling district on convalescence or on leave. I did not see Mount Everest while I was there, but I am told that the view of the mountain from



A bridge with foundations laid on wool. Photograph by R. Rawlinson, Whaley Bridge.

Darjeeling is not really impressive. I should certainly like to see it, but I think I have enjoyed a scene of far greater grandeur and magnificence. This was the Range of the Snows, in the Himalayas, when the Moon was full, the white-capped summits gleaming ghost-like and presenting a wonderful spectacle, although 40 miles away. The Snow Range includes Kanchenjunga, the height of which is 28,146 ft., while another peak of the range is Kabru, 24,002 ft.

My stay was made at Kalimpong, and on the way there I took the accompanying photograph of the Coronation Bridge. This carries a road across the River Tista, which brings down molten snow from the mountains many miles to the north. At the time when I obtained the picture the river was swollen, as it was taken during the monsoon period.

Later I spent 14 days leave at Coonoor, in the Nilgiri Hills of Southern India. This meant a three-day journey in each direction, and gave me the opportunity of spending a few hours in Madras. At Coonoor I found it difficult to realise that I was only about 11 deg. N of the Equator. The explanation is that the place is at a height of about 6,000 ft. above sea level. To me the weather seemed very much like that of England, and there was a fair amount of rain, as I was there at the wettest time of the year. I had a grand time, receiving the best of hospitality wherever I went.

A rack railway climbs the hills to Coonoor. This was closed on my outward journey, owing to a landslip, but I travelled down it on my return. I noticed gradients of 1 in 12, but could not say whether these were the steepest on the line.

A. Elvey (India).

BRIDGE BUILT ON WOOL

At Hayfield, Derbyshire, can be seen a bridge built on wool foundations. When it was to be erected in 1837 one side of the stream was found to be composed of quicksands, into which the stone foundations sank. The difficulty was overcome by pressing huge bags of wool into the quicksands so that the weight of the stonework could be distributed over a larger area, and on these bags of wool the foundations were built. The fact that the bridge has survived for over 100 years under modern traffic conditions is ample testimony to the success of the scheme.

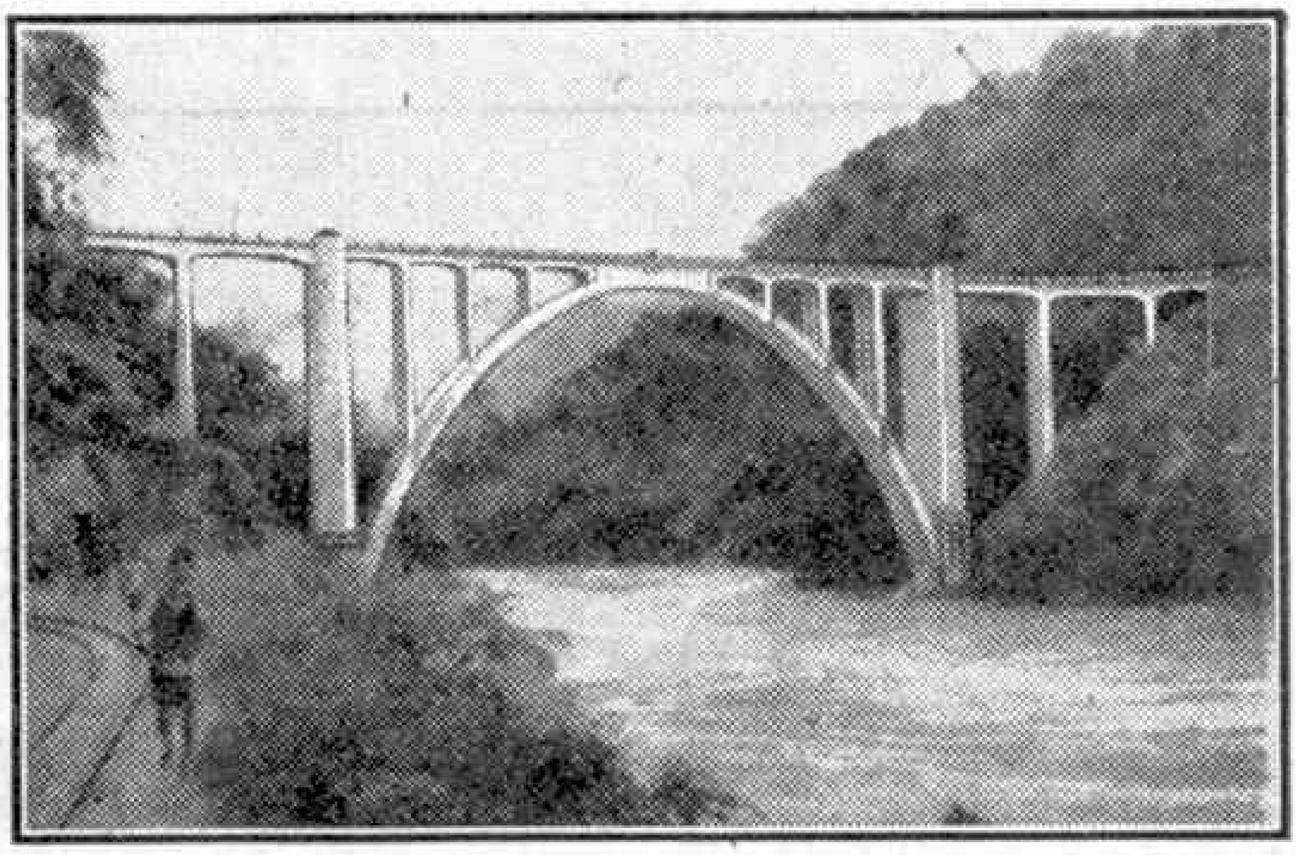
R. Rawlinson (Whaley Bridge).

A LONG NIGERIAN RAILWAY JOURNEY

The journey was to occupy about 2½ days. The gauge of the Nigerian railway is 3 ft. 6 in., but the coaches are about as wide as those of British railways. The first-class compartment in which the trip was made had glass windows and was provided with mosquito netting. There were third-class coaches for the natives, and on looking at these out of the windows after the train started, black feet could be seen poked out of them and smoke was rising from them. A fellow passenger said that the natives always pushed their feet out of the windows to cool them, and that the smoke came from the fires they started to cook their meals on. The sleepers of the line were of steel; wooden sleepers would have been eaten away by ants.

The train seemed to stop and start again almost anywhere, but in spite of this good time was kept. At each station native women came to the door with fruit, offering large numbers of bananas, oranges and pineapples for ridiculously small sums. They were all very friendly. Good meals too were served on the train, including fish and South African lamb, with "fresh" meat and vegetables brought considerable distances.

R. Rothwell (Flixton).



Coronation Bridge, which crosses the Tista, in northern Bengal. Photograph by A. Elvey.

Among the Model-Builders

By "Spanner"

AN ARGENTINE BOY'S FINE BATTLESHIP

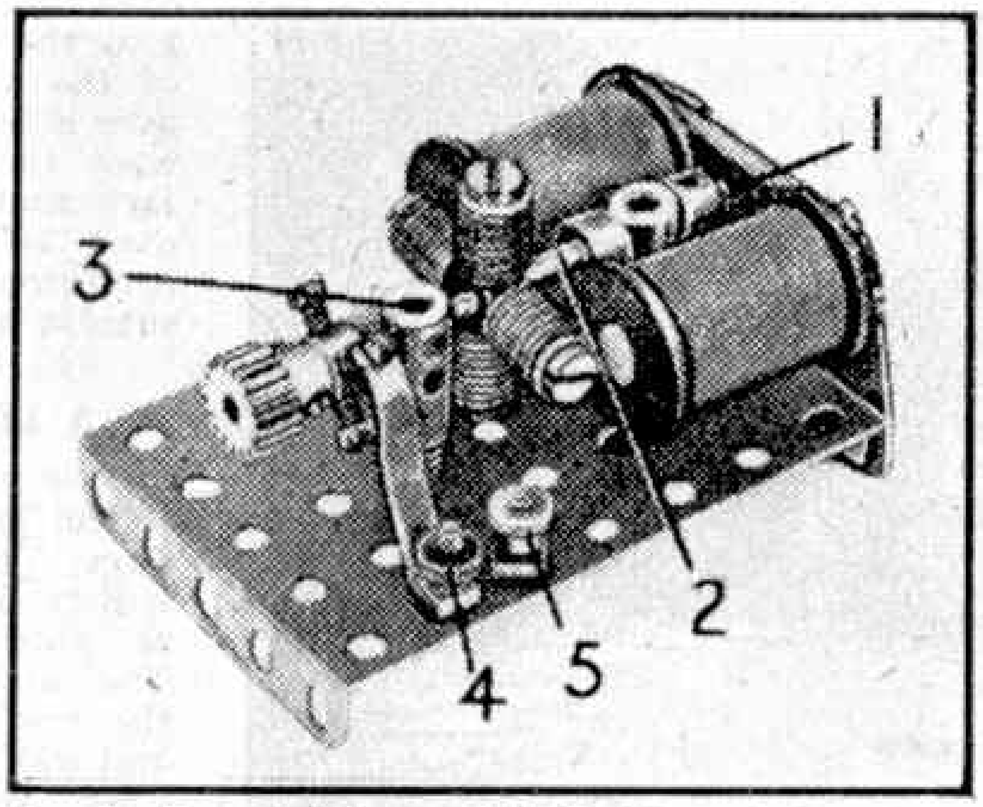
Battleships and heavy cruisers are excellent subjects for large and impressive Meccano models, and I feel sure that all Meccano users will be interested in the very fine model of the Argentine battleship "*La Argentina*" that is illustrated on this page. This was built some time ago by Pablo Giese, Buenos Aires, and is one of the best ships of its kind that I have seen. It is roughly 7 ft. in length, and its fittings include all the deck structures and armament details it was possible to reproduce realistically in the space available. Particularly interesting is the construction and equipment of the main control tower, and the manner in which the characteristic shape of the real structure has been obtained is most creditable.

It will be noticed that the ship carries two miniature aircraft, and that the same care has been given to the construction of these as to that of the ship generally. One of the aeroplanes is mounted on a launching catapult, and the other is accommodated in the deck space between the funnel and the rear mast, the wings being folded so that the aircraft takes up as little room as possible.

HOW TO MAKE A SIMPLE ELECTRIC MOTOR

Archie Henderson, London, S.W.20, is interested in electricity and electrical instruments, and he wrote to me for details of a simple motor he could build up mainly from Meccano. There are of course many different ways in which simple motors can be made almost entirely from Meccano parts, and for the benefit of Archie and others who may be interested I am giving a description of a simple and easily-built motor that works well and can be operated from a 6-volt transformer. A picture of the motor appears on this page.

The complete motor is carried on a baseboard formed by a 3½" × 2½" Flanged Plate. It consists mainly of two solenoids, an armature in which the poles are formed from Washers, and a commutator. In the absence of Meccano Bobbins (Part No. 181) it is quite easy to make suitable bobbins for the solenoids from brown paper and two discs of cardboard about 1" diameter. The paper should be cut into a strip about 12" × 1" and then rolled into a tube by wrapping it around a 1½" Meccano Rod, which forms the core. The cardboard discs are then pierced centrally to slip over the protruding ends of the Rod and pushed tightly against the paper tube, where they are glued in place. Each bobbin is wound full with 24 S.W.G. S.C.C. wire, and the ends of the winding are left protruding. After the final layer is wound on, the wire is covered with a strip of paper glued in place.

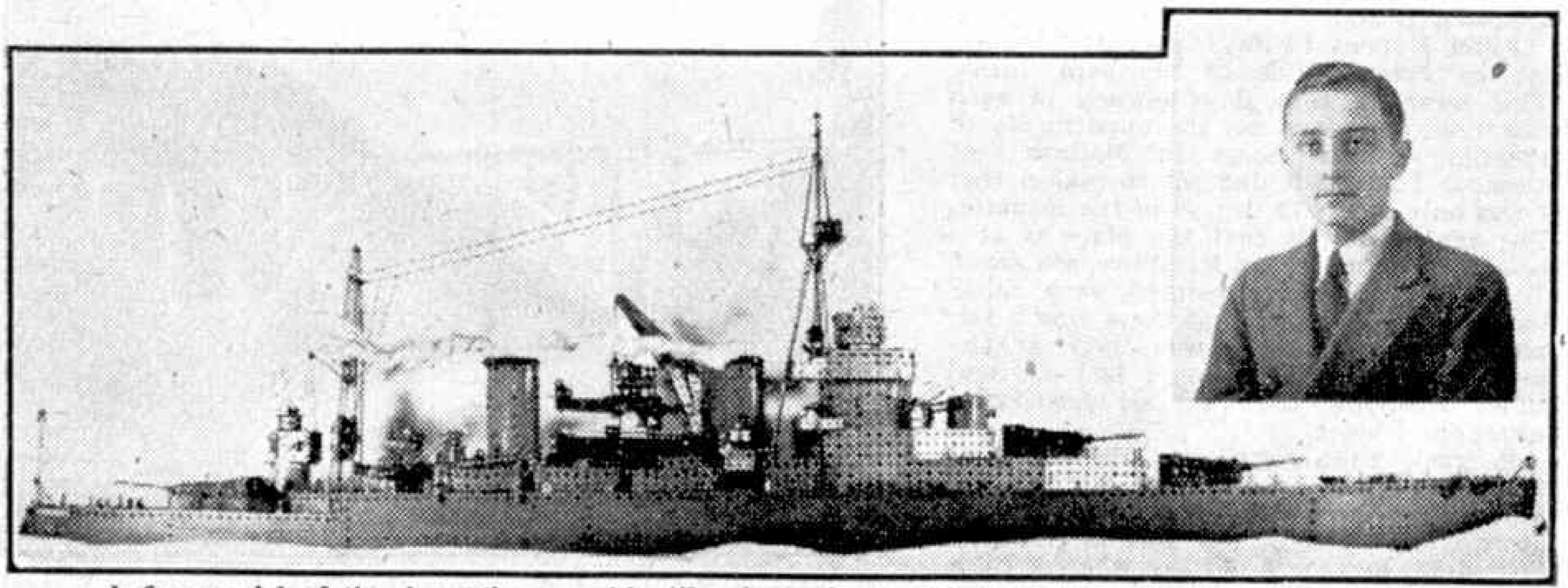


A simple electric motor built mainly from Meccano parts.

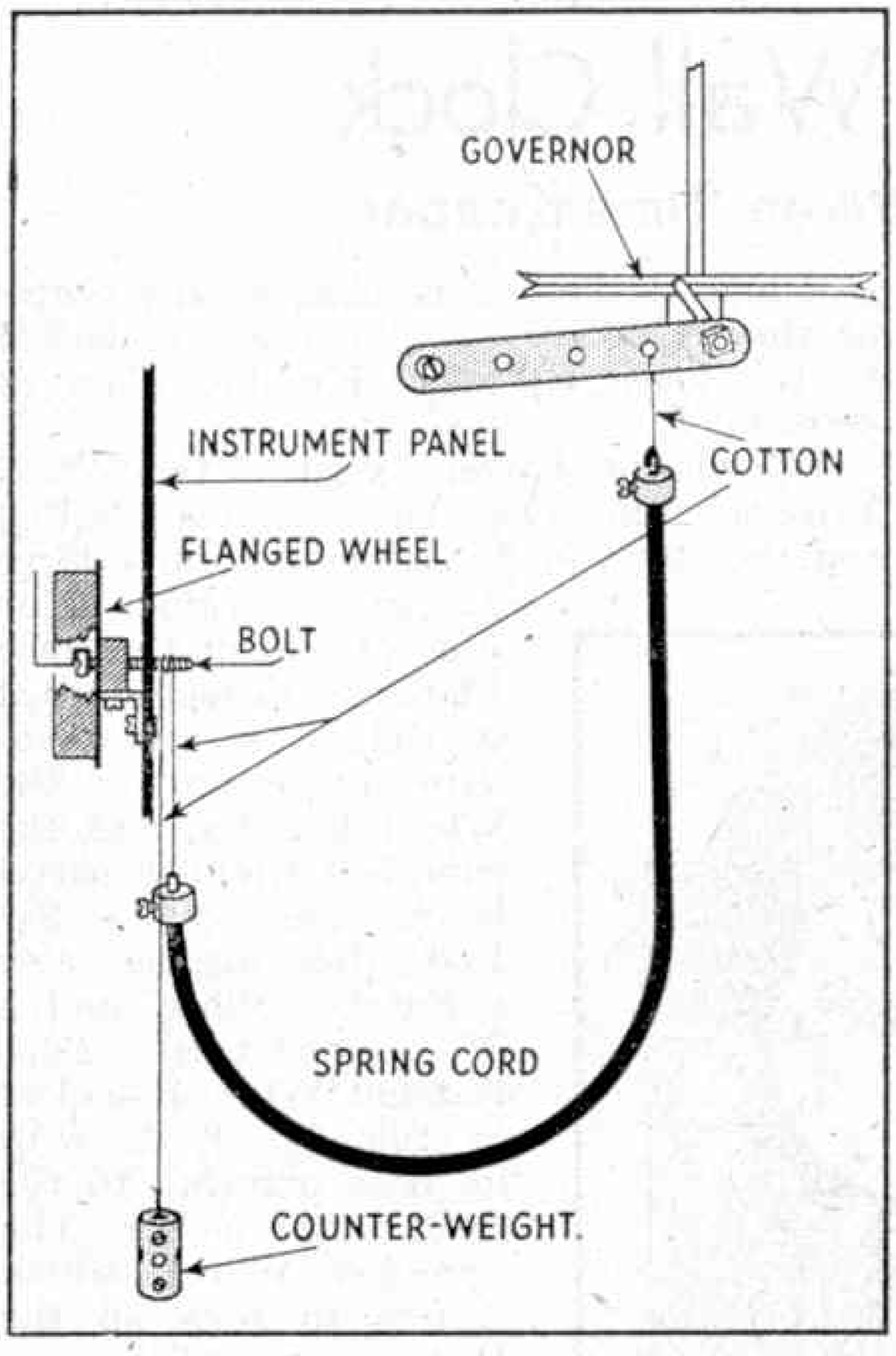
The solenoids are then fitted to a yoke formed from five 2½" Strips 1, which are supported from the base by 1½" Strips. The armature is built up on a "spider" taken from a Universal Coupling. Four Pivot Bolts, each carrying 11 Washers on its shank, are screwed into the tapped holes of the "spider." The commutator also is a "spider," but it carries four bolts in its tapped holes.

The armature shaft 2 is journalled in bearings formed by Threaded Couplings 3. The position of the poles should be adjusted so that they are as near as possible to the ends of the solenoid cores, and the commutator should be positioned so that the bolts lie half-way between the poles of the armature. The brush is a piece of springy brass such as a Pendulum Connection held in place by a bolt 4 insulated from the base by washers made from stiff paper. A second bolt 5 similarly insulated is fastened next to the terminal 4. Care should be taken to see that the shanks of these bolts do not touch the sides of the holes through which they pass. This can be prevented by squeezing the paper washers slightly into the holes to form a thin sleeve around the shank of the bolt.

The electrical



A fine model of the Argentine warsLip "La Argentina" with its builder, P. Giese, Buenos Aires.



A diagramatic arrangement of the working indicator gauge system described on this page.

connections are made as follows. The outer end of the winding of the near solenoid is earthed to the base-plate by fastening it to a nut and bolt. The inner end of the same winding is then connected to the outer end of the wire on the second coil, and the remaining free wire is connected to terminal 5.

A BUILT-UP CRANK HANDLE

N. C. Ta'Bois, Woodford Green, sends these details of a useful type of built-up crank handle. It consists of a Worm slipped on the shank of a 1⅛" Bolt, which is then passed through the elongated hole of a Crank and held by two nuts. The Worm, which must be free to rotate on the Bolt, enables a good grip to be obtained.

This idea should be of value in cases where the ordinary Meccano Crank Handle is not available or where space and other conditions do not allow its use.

A NOVEL IDEA FOR INDICATOR GAUGES

I am reproducing on this page a drawing by L. R. Dougal, London S.W.20, showing an ingenious method of arranging speed indicating meters for showing visually the running speed of engines and similar models incorporating revolving shafts. The idea is to use such meters in place of the dummy gauges and dials usually fitted to models of this type.

Briefly the scheme suggested by Dougal is as follows. A Flanged Wheel is fitted with a ½" × ½" Angle Bracket attached to its boss by a bolt and Washer. The Flanged Wheel is then mounted on the instrument panel of the model. A ¾" Bolt is provided with a pointer consisting of a short piece of bare copper wire, which is wound one turn round the bolt head and then formed as shown in the drawing. The bolt is passed through the boss of the Wheel and through the panel, from which it projects slightly.

A flexible cable of the Bowden type is made from Spring Cord with a piece of thread running through it. The thread is attached to the cut-off lever on the governor of the engine and then is led to a position immediately beneath the instrument panel. The cable is arranged in position and held in place by Collars fixed to the frame of the model. The thread passes twice around the projecting bolts of the indicator gauge and a Coupling is attached to provide a counter balance weight.

When the model is set in operation the governor raises the cut-off lever, thus pulling the thread through the cable, and so turns the ¾" bolt and its pointer. The Flanged Wheel is fitted with an appropriate scale made from cardboard.

This system can be used also for steam or water pressure gauges, in which case the cable is operated by a dummy cock, which when turned transmits motion to the pointer.

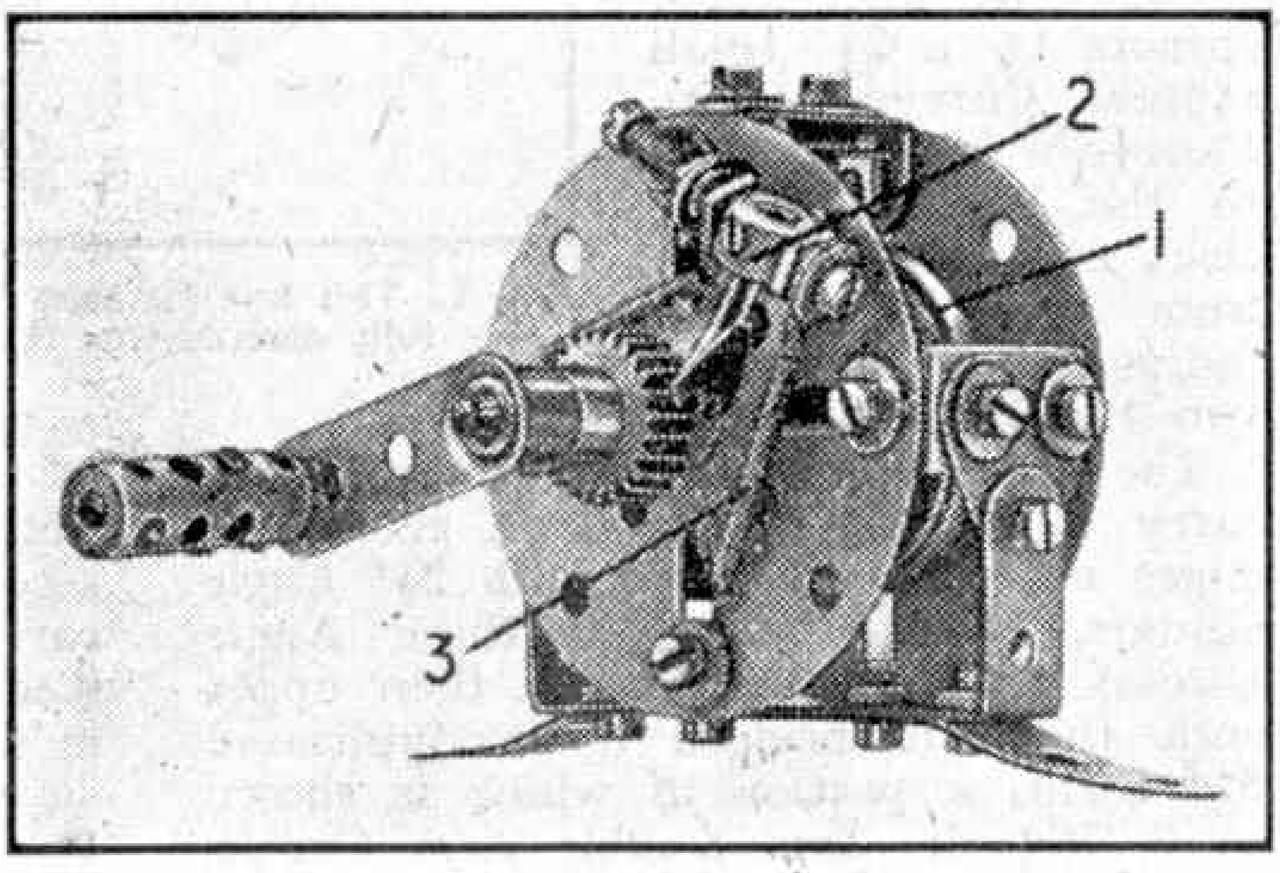
Dougal finds that one governor can be used to operate several gauges, and he says that these look very effective when working. The indicator pointers rise slowly when the governor begins to function and quiver realistically all the time the model is in motion.

MECCANO HELPS AN ANGLER

H. Davies, Newcastle, who is a keen angler, was in need of a new fishing reel to replace one that had been damaged, and it occurred to him to build one from Meccano parts. The results of his experiment are shown in the lower illustration on this page. The sides of the reel are Face Plates, which are joined together by six 1" × ½" Angle Brackets. A 3" Rod is pushed through the bosses of the Face Plates, which are carefully aligned to ensure free running, and it carries two 1½" Pulleys 1 placed boss to boss. A Collar is fixed on one end of the Rod and a ¾" Pinion and a Crank are secured to its other end. The Crank carries a handle consisting of a Threaded Pin fitted with a Collar and a Coupling. The 1" × 1" Angle Brackets are then connected by a 4½" Strip bent to the shape shown in the illustration.

A check device is fitted, consisting of a Centre Fork gripped in a Collar 2. The latter part is pivotally mounted on the Face Plate by a bolt and nut. The check mechanism is tensioned with Spring Cord 3 as shown, one of the bolts used for attaching the Cord to the Collar being ¾" long. This Bolt serves as a lever to raise the Centre Fork out of mesh with the ¾" Pinion so that the reel can revolve freely when casting.

The check device acts like a pawl and ratchet, allowing winding in one direction only. If a two-way check is desired it is only necessary to adjust the Centre Fork.



A home-made fishing reel for the Meccano angler

A Meccano Wall Clock

A Simple Weight Driven Time-Keeper

THE fine wall clock described in this article is quite simple in construction and will interest specially model-builders who have only a limited supply of Meccano parts at their disposal. The frame is formed from two 12½" Angle Girders 1, fitted with two 5½" × 2½" Flanged Plates, one of which is shown at 2; the other has been omitted in order to expose the gear-train. A 5½" Angle Girder 3 is bolted across the upper flanges of the Flanged Plates 2, and two further Girders of similar size are bolted to the inside edge of each Plate. One of these Girders is shown at 4, and they both form supports for two 4½" × 2½" Flat Plates. One 5½" × 2½" Flat Plate and two 5½" Strips are bolted between the two rear flanges of the Plates 2, Fig. 2. Two 4½" Strips 5 are fitted as shown.

Two 12½" × 2½" Strip Plates are secured to the Girders 1, and bridged at the bottom by a 5½" × 2½" Flexible Plate. At the top two 5½" × 2½" Flexible Plates are fitted as shown in Fig. 1, and connected together at their upper corners by a 2½" small radius Curved Strip. Fancy work is added to the bottom of the clock and this is formed from five 2½" small radius Curved Strips and two 4" Curved Strips.

The lower ends of the Girders 1 each carry a 2½" × 2½" Flat Plate, the outer edges of which are fitted with 2½" Angle Girders. The Flanges of these Angle Girders point inward, and at their upper ends they are bridged by a duplicated 5½" Strip, a portion of which is shown at 6, Fig. 1. Two Double Arm Cranks are now fitted to form reinforced bearings,

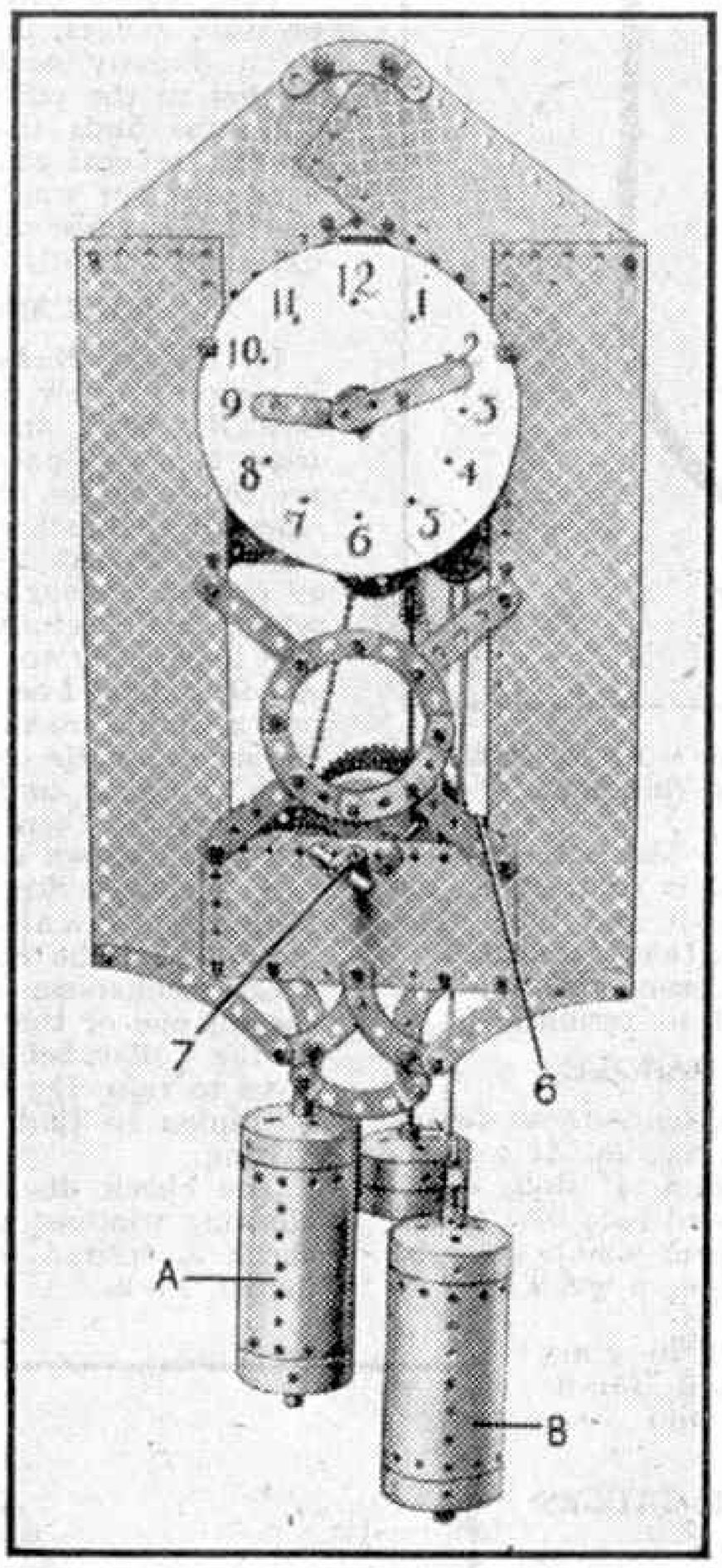


Fig. 1. This fine Meccano Wall Clock is fully described on this page.

and one of these is secured to the centre of the 5½" Strip 6. The other is bolted to the lower 5½" × 2½" Flexible Plate as shown.

The winding barrel consists of two Wheel Flanges and two Face Plates, bolted together by two ¾" Bolts, to form a large diameter drum. The boss of one of the Face Plates is turned inward so that it is accommodated inside one of the Wheel Flanges, and the complete winding barrel is mounted on a 3½" Rod that carries also a Ratchet Wheel and a 3" Sprocket. The Ratchet Wheel is locked in the 3½" Rod, with its boss pointing to the back of the model. The Sprocket Wheel, which is free to turn on the Rod, is mounted in a similar manner, but is spaced from the Ratchet Wheel by a Washer. In one of its outer holes a Pivot Bolt is secured, and on this is carried a spring-loaded Pawl. The front end of the 3½" Rod carries a Coupling 7 fitted with a 1½" Rod that forms the winding handle.

The 3" Sprocket drives, through a length of chain, a ¾" Sprocket Wheel mounted on the same Rod as a 1½" Sprocket 8. A second length of Chain connects the Wheel 8 with the Sprocket Wheel 9, which is mounted on a 3" Rod together with a 57-teeth Gear that is in mesh with a ½" Pinion locked on the same Rod as a second 57-teeth Gear. This last Gear is carried on the front end of its Rod immediately behind the clock face, and is in engagement with a ½" Pinion mounted on the same Rod as the Gear 10. The Rod is carried at one end in a bearing formed from a Double Bent Strip. A ½"

Pinion on the escapement rod is in constant mesh with the Gear 10.

The Gears that transmit the movement from the minute hand to the hour hand are now fitted. The Rod bearing the Sprocket 9 is fitted with a ½" Pinion that meshes with a 57-teeth Gear 11 on the Rod 12. This Rod is 3½" in length and carries the minute hand at its outer end. At its centre is a ¾" Pinion, meshing with a 50-teeth Gear on the Rod 13, and also a 1" Gear that engages with a similar part on the Rod 14 that carries also a second ¾" Pinion. This Pinion drives a 50-teeth Gear on the Rod 15, on the front end of which is a ½" Pinion. A 57-teeth Gear that is free to turn on the Rod 12 meshes with this latter Pinion, and is fitted with a ½" Reversed Angle Bracket. This part is bolted to the 57-teeth Gear and it protrudes through a hole in the centre of the face. A 1½" Strip represents the hour hand.

The escapement is a 2" Sprocket Wheel 17 mounted on the final shaft of the clock drive. The pallet is built up from a 1½"×½" Double Angle Strip 18 attached by two ½"×½" Angle Brackets to two Cranks. The Angle Brackets are bolted together to form a double bracket, and the Cranks are locked on the ends of two short Rods carried in the Strips 5. The method of mounting the crutch and pendulum will be clear from the illustration. Care must be taken when adjusting the ends of the Double Angle Strips, and the exact position of the pallets in relation to the escapement wheel must be gauged very accurately.

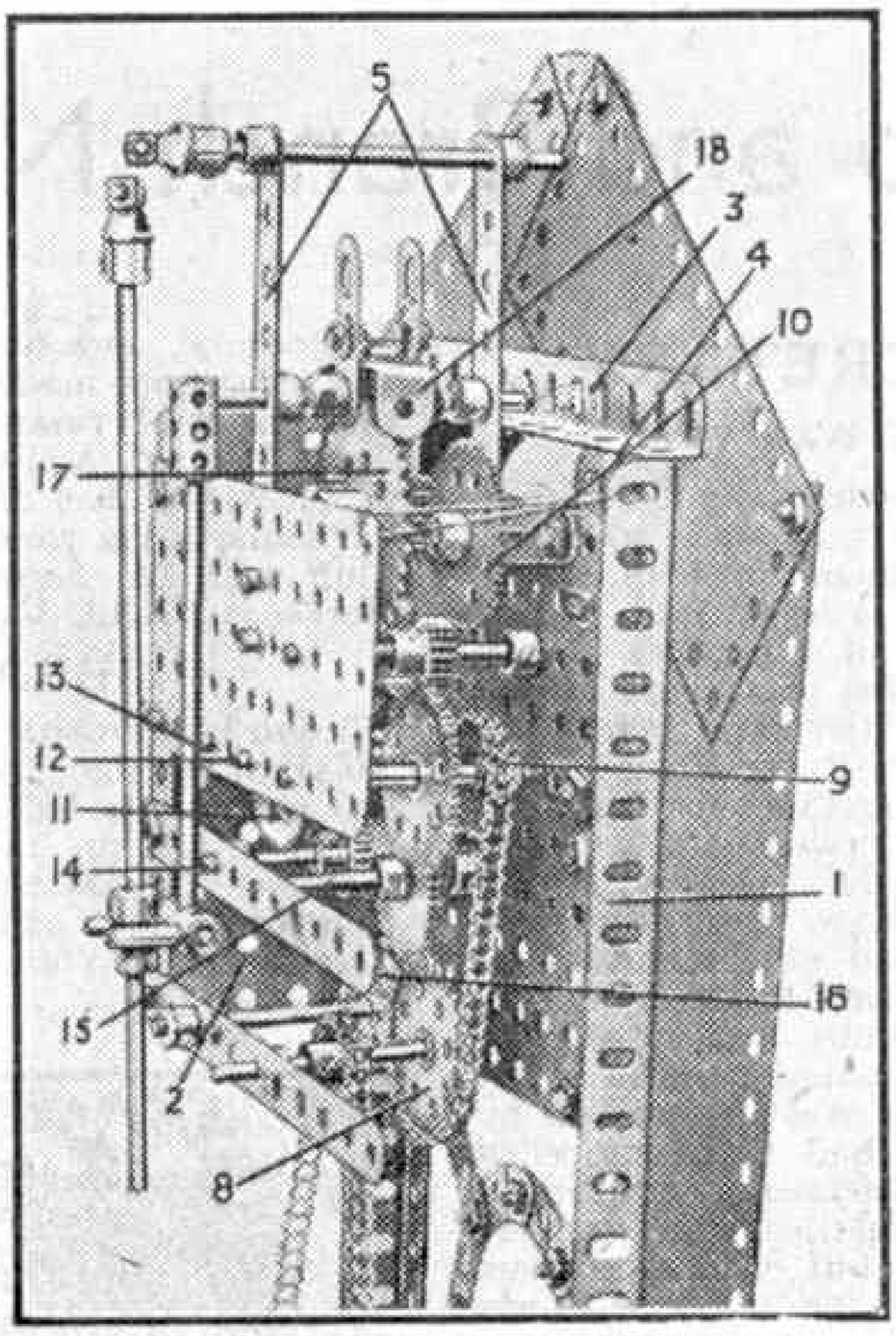


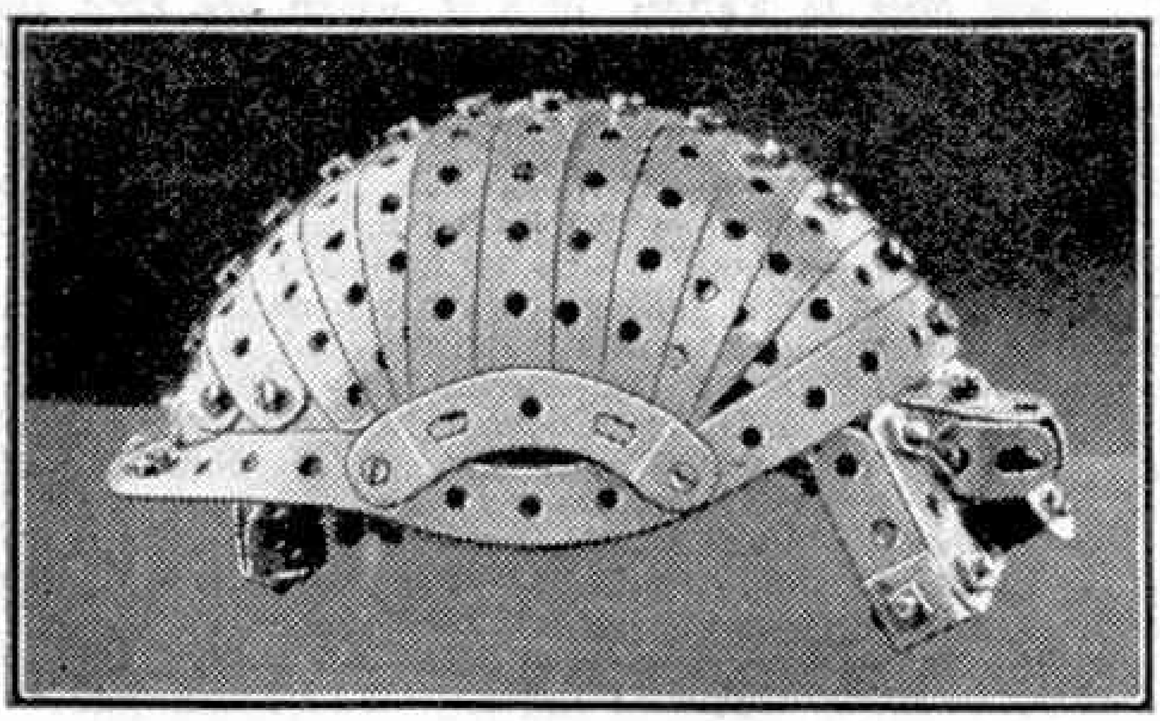
Fig. 2. The gearing of the Wall Clock.

The flexible connection at the top of the pendulum consists of two short lengths of flexible steel wire. The pendulum itself is built up from one 8", one 11½" and one 3½" Rod joined together by Couplings. The "bob" consists of two Boiler Ends suitably loaded.

The driving weights shown in Fig. 1 are formed from Boilers suitably loaded, and are attached to the driving cords by End Bearings. The cord from weight A is taken to the drum, round which it is wound in an anti-clockwise direction. The cord from B passes over the Pulley 16 and is wound anti-clockwise on the drum.

"Birds and Beasts" Model-Building Contest

We are organising this month a novel contest to which we have given the title "*Birds and Beasts*" Competition. This title includes all living things, except human beings! Curiously life-like models of this kind can be constructed from Meccano parts and the competition offers very wide scope for originality. A typical example is the tortoise shown in the accompanying illustration.



A realistic Meccano tortoise, by J. Devereux, Dublin.

Competitors may build their models either solid, or in the flat to resemble a drawing, according to their wishes and the quantity of Meccano parts available.

After completing their models competitors should send either photographs or sketches of them to: "*Birds and Beasts Competition, Meccano Ltd., Binns Road, Liverpool 13.*"

The Contest will be divided into two sections. A, for competitors of all ages living in the British Isles, B, for competitors living overseas. The closing date for Section A is 31st August, and for Section B 28th February 1946.

The prizes offered in each section are as follows: First, Cheque for £2/2/–; Second, Cheque for £1/1/–; Third, Cheque for 10/6. There will be also several consolation awards.

Club and Branch News

WITH THE SECRETARY

A DUTCH CLUB IN THE WAR YEARS

Guild members all over the world wondered what happened to Clubs in Holland and other countries that were over-run by the Germans in 1940. They will be glad to know that I have heard from one of these Clubs, which in spite of all difficulties did all that it could to carry on with the good work during the intervening years. This is the Maastricht M.C. in Holland. The Leader is Mr. F. L. Bingen, who has written to tell me that the Club continued to hold meetings, but at greater intervals than in peace-time and with lower attendances. This is natural enough, for some members were transported to Germany for labour service, and others had to go into hiding. One of those removed to Germany was Mr. P. Bingen, the former Leader and brother of the present Leader. There came a time when meetings could not be held, but contact was maintained by writing, even with those who had been compelled to go into hiding. All the time the members continued to wear their badges openly. Meetings were resumed when Maastricht was liberated, but even then there were serious losses, for many of the Senior members volunteered for military service.

It is interesting to hear that the bound volumes of the "*M.M.*" in the Club's library were read over and over again by those members who could get hold of them. The issues of the years of German occupation of course were never seen, and the Leader and members would be grateful for any spare copies from October 1940 onward that could be sent to them. If any readers have copies that they can send I should be glad if they would let me know. Copies must not be sent direct to Mr. Bingen.

The Club officials are full of enterprise and are looking forward to an influx of new members. They hope to arrange walking and cycling tours during the summer, but lack of tyres in Holland will make cycling very difficult, if not impossible. A good programme for the following winter, with plenty of good model-building, also is being planned, and I hope that the Maastricht M.C., the first in liberated Europe with which I have been able to get in touch, will then have a really prosperous time and will be able to forget the trials and troubles of the war years.

CLUB NOTES

Barkers' Butts School M.C.—A successful Exhibition of Meccano models and Hornby Train layouts has been held. A fine summer programme is being followed, and new members continue to join. The weekly Model-building Contests are always keenly contested. The Eiffel Tower is being constructed as a Club model, and preparations are being made for a display on the School's Open Day. Club roll: 29. *Secretary:* D. Percival, 100, Overslade Crescent, Coundon, Coventry.

Crosland Lodge (Huddersfield) M.C.—Most meetings are now being held out of doors, including Cricket Matches, Cycle Runs and Rambles. The Meccano Model-building programme is being continued as usual and the greatest enthusiasm generally prevails. Club roll: 20. *Secretary:* D. Graham, 19, Moorside Avenue, Crosland Moor, Huddersfield.

AUSTRALIA

Melbourne M.C.—Good meetings continue to be held. Lantern Lectures on railway topics and a Film Show dealing with the story of the Victorian Railways were popular items. At other meetings goods train operations have been carried out. A Free Lance Night is included at intervals in the programme, members then building and operating any Meccano model they please or carrying out operations of various kinds on the Club's Hornby Train layout. A member of the Club at present in the R.A.A.F. has described some of his experiences, particularly his various train journeys while serving. Club roll: 12. *Secretary:* L. Ison, 8, Hayes Street, Northcote, N.16, Victoria, Australia.

BRANCH NEWS

Long Itchington—A new track has been laid down. This has a large covered station and a goods yard. The station is lighted and colour-light signals are to be fitted on the track. Other activities have included the construction of a Meccano mechanical excavator and additions to the Branch theatre. *Secretary:* H. Windsor The Shop, Long Itchington, Nr. Rugby.

A Meccano Club wedding in Johannesburg. Members of the Malvern M.C. with an arch of outsize Meccano Strips, made of wood, at the wedding of Mr. W. Cox and Miss D. Farrow, both of whom are keen and active members of the Club and have held official positions in it.

Gainsborough—The Branch layout has been extended and more tracks have been provided for the main station, which is intended to have five platforms. More rolling stock has been acquired, and improvements generally have resulted in running of increased interest. At one meeting the outstanding feature was a B.L.A. Leave Train, which was given priority in working. *Secretary:* F. J. Newman, 26, Birrell Street, Gainsborough.

Canford Magna—Members are busy constructing rolling stock and other items for the Branch Layout. A temporary test track has been laid down on which to carry out experiments. A special feature is made of Visits to places of railway interest, especially to watch actual operations. The Branch is now in need of more members and a new Branch room. *Secretary:* R. M. Jelfs, 1, Broadway Court, Broadstone, Dorset.

The Hornby-Dublo Isolating Rail

LAST month we dealt with the wiring and contro arrangements for Hornby-Dublo layouts where the independent control of separate locomotives or trains on their respective tracks is required. We showed that the insulation of one track from another that is necessary for independent control can be effected by a break or insulating gap in the centre rail only, so long as each main section thus formed has its own power supply. In certain circumstances the standard Isolating Rail can be used to provide this break, but at other times layout requirements prevent its use in this way, and the removal of the centre rail connecting clips, or their separation by strips of paper, has to be carried out.

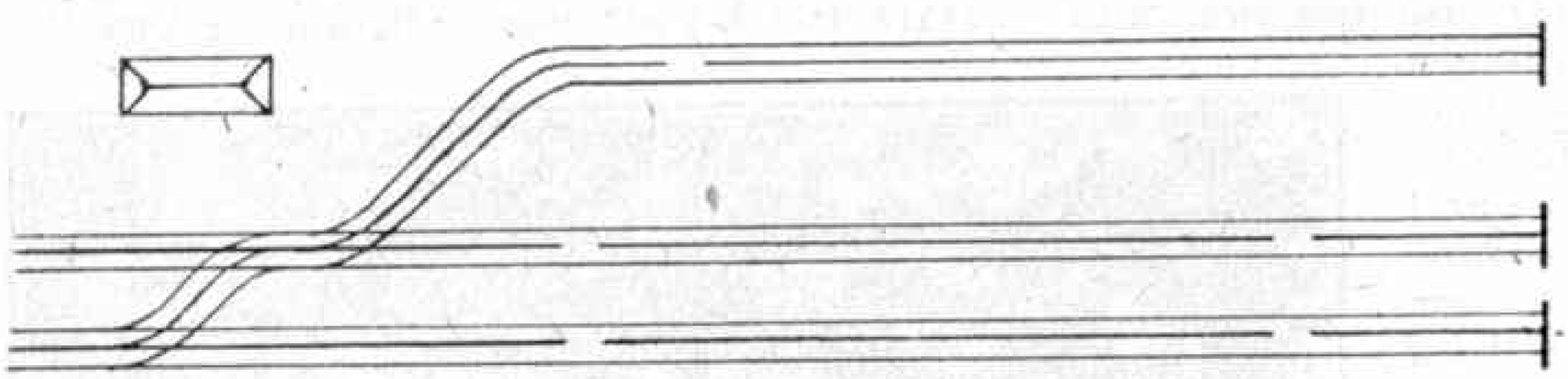


Diagram of the terminal layout with isolating sections as referred to in this article.

In addition to its use in this way the Isolating Rail is of special value where it is required to break up a main section of the track into smaller sections, all subject to the one main Controller, that can be made "live" or "dead" as required by the movement to be carried out. We suggested last month that one of the main sections of the layout then being dealt with might include either a marshalling yard or a terminal station. The accompanying diagram shows a typical terminal layout of the three-track variety, suitable for use with the Dublo City Station. There are, it will be seen, two main tracks connected by a "trailing" crossover, and there is in addition a subsidiary line reached by means of points. Platform arrangements would be as often shown in the illustrations on these pages; the lower main track as we are looking at the diagram would be served by the side platform, while there would be an island platform between the upper main and the subsidiary track, all platforms being joined by the circulating area behind the buffer stops with which each track would be terminated.

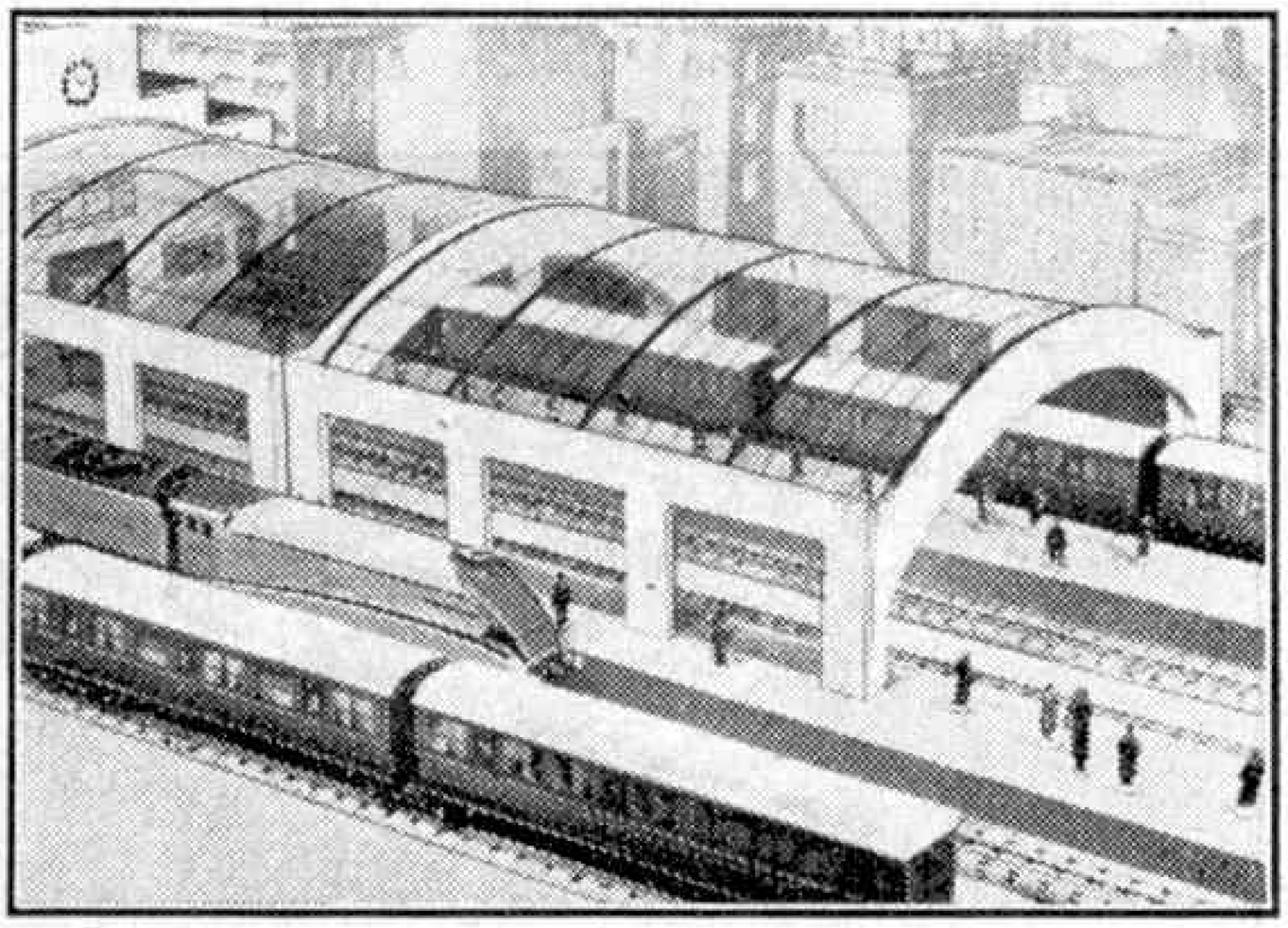
The exact location of the Isolating Rails depends to a certain extent on the ideas of individual operators, but the arrangement shown in the diagram may be taken as the most usual. Each of the Isolating Rails used here should be connected to an Isolating Switch, if these are available, or to any simple "on-off" switch. The switches should be conveniently located near to the Controller and any other apparatus belonging to this section of the line.

Normally we may take it that the usual state of the switches is "off." Let us suppose that we are starting operations at the station, and we first bring an engine down from the shed along the line. This engine is required to wait on the subsidiary track (the uppermost one in the diagram) in order to take out a train that is to arrive later. We see that the points are correctly set, cut in the appropriate switch, and then bring the engine along the up track and on to the road where it is to wait. We make sure that it stops beyond the Isolating Rail, and then cut out the switch again; the engine is now standing on an isolated or "dead" section, and movements on any of the other tracks can be made without affecting it.

Now an up train is due which is to arrive on the centre track in the station. Assuming the crossover points are correct—they should normally be set for the straight it must be remembered—we cut in the two switches controlling the two sections formed on the track concerned. We can then run our train in, bringing it gently to rest alongside the platform in the appropriate manner. The use of what we may call the "buffer stop" section at the inner end of the two main tracks will now be apparent; the engine is uncoupled and run up to the buffer stops and the switch for this section is cut out.

Next we cut in the subsidiary line switch, remove the engine already waiting there to the main line, and back it on to the train just arrived. After the necessary setting of the points the train can leave in charge of the fresh engine, making its way along the lower road in the diagram towards the main circuit. The engine left at the buffer stops can now be freed for other duties, possibly waiting on the subsidiary line for the arrival of another train, when similar operations can be repeated. Engines used in this way are known as "turnover" locomotives, each one leaving with the next train that arrives.

Buffer stop sections should be long enough to hold an engine and tender so that express trains can be dealt with conveniently. It will be as well also if we can make the sections between the two Isolating Rails on each of the main tracks shown sufficiently long to hold a complete train and locomotive. Trains can then be prepared and held at either of the main platforms, and movements to and from the subsidiary track can still be made. Many other possibilities will no doubt occur to readers as they try out the scheme in practice.

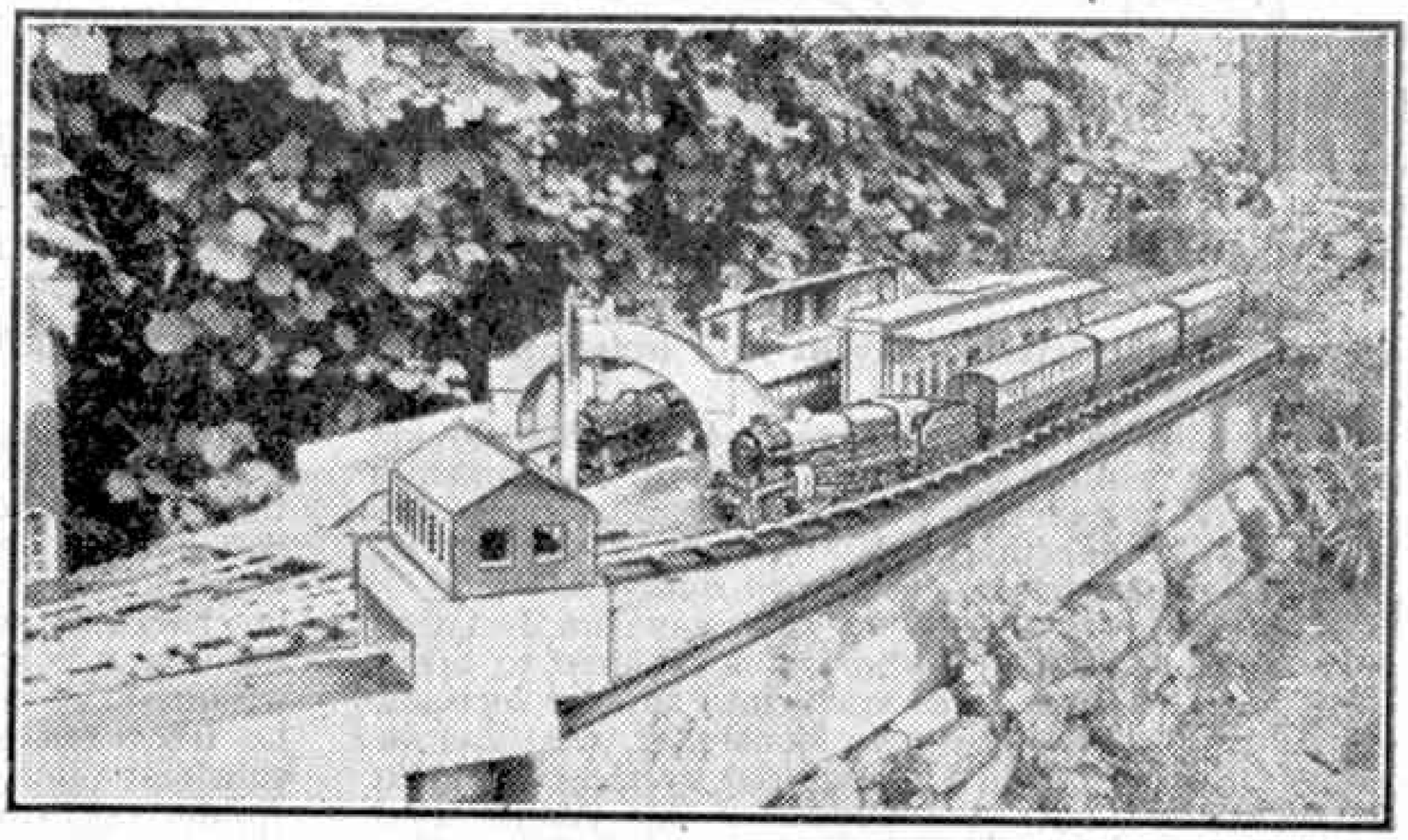


A typical Hornby-Dublo terminal showing in the foreground a 4-6-2 Streamliner waiting for its train on a spare road outside the station.

A Hornby Railway in the Garden

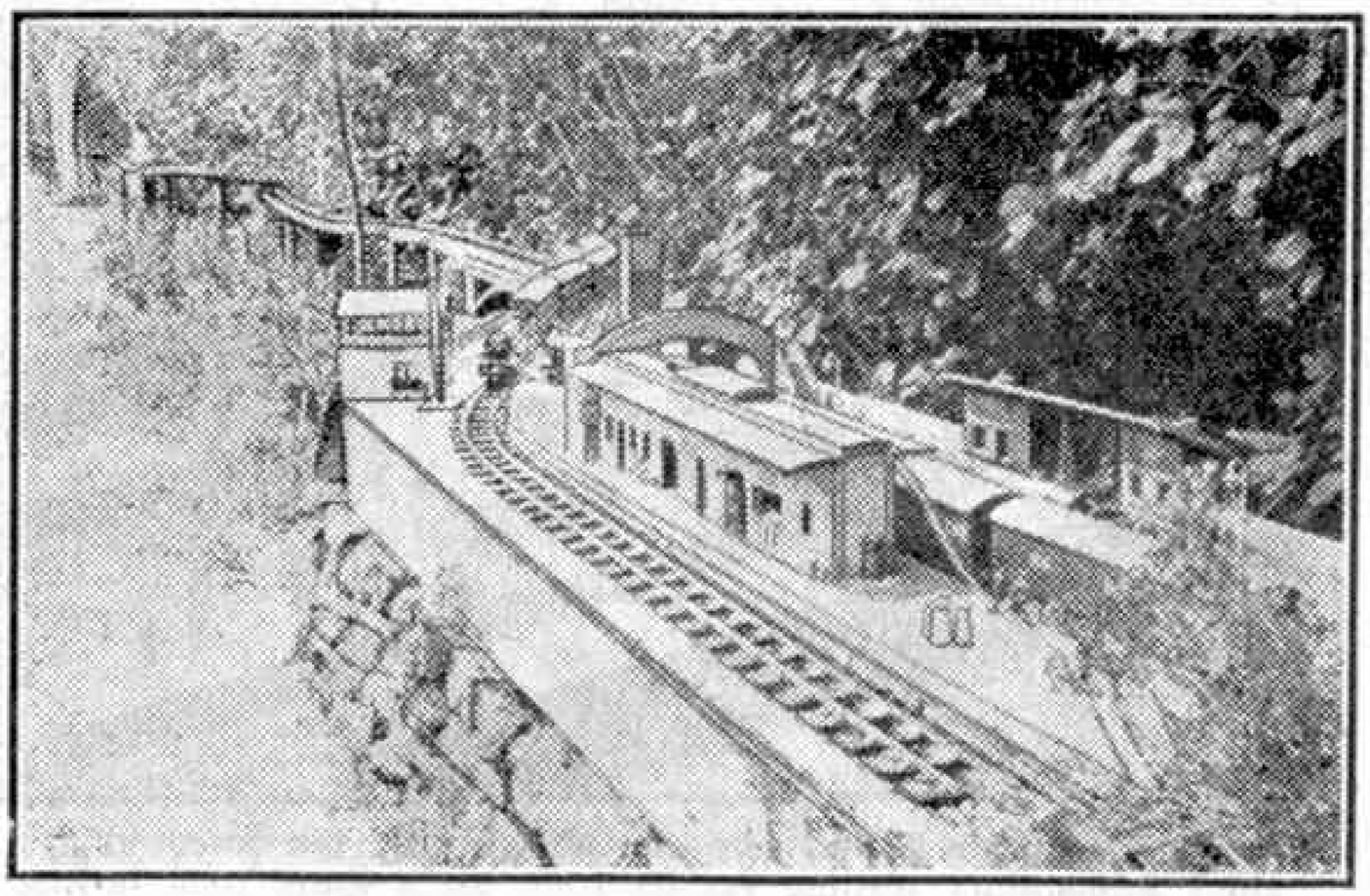
AT this time of the year, with the prospect of holidays shortly to begin, the Hornby Railway owner is sure to think of the possibility of using his railway equipment out of doors. It must be said at once that Hornby rails, either steel or tinplate, and accessories, are definitely intended for use indoors, and cannot be employed on a permanent outdoor line, because exposure to the weather causes rust and general deterioration. However, it is possible to use Hornby equipment out of doors in fine dry weather if one important precaution is taken. This is to wipe thoroughly with a cloth all the items of track, and the accessories, that have been in contact with the ground, before putting them away at the end of the day. This ensures that no damp or moisture has formed on them, as it will tend to do towards evening. An "oily" wipe is recommended as a preventive of possible rust. If the railway should be caught in a shower the drying and wiping of all equipment must be done very thoroughly indeed.

Permanent outdoor miniature railways are naturally different in character. An interesting railway of this kind forms the subject of the accompanying illustrations. This is known as the *"Clifton Lines"* and has been developed by a reader who modestly hides his identity behind the pen-name *"Rosco."* Actually the system is a reconstruction of another layout on a different site which was described in the *"M.M."* a number of years ago as the *"Sunshine Lines."* In its original state the layout was continuous, but the new site is more adapted to the end-to-end form now in use. The details which follow are based on notes submitted by the owner.

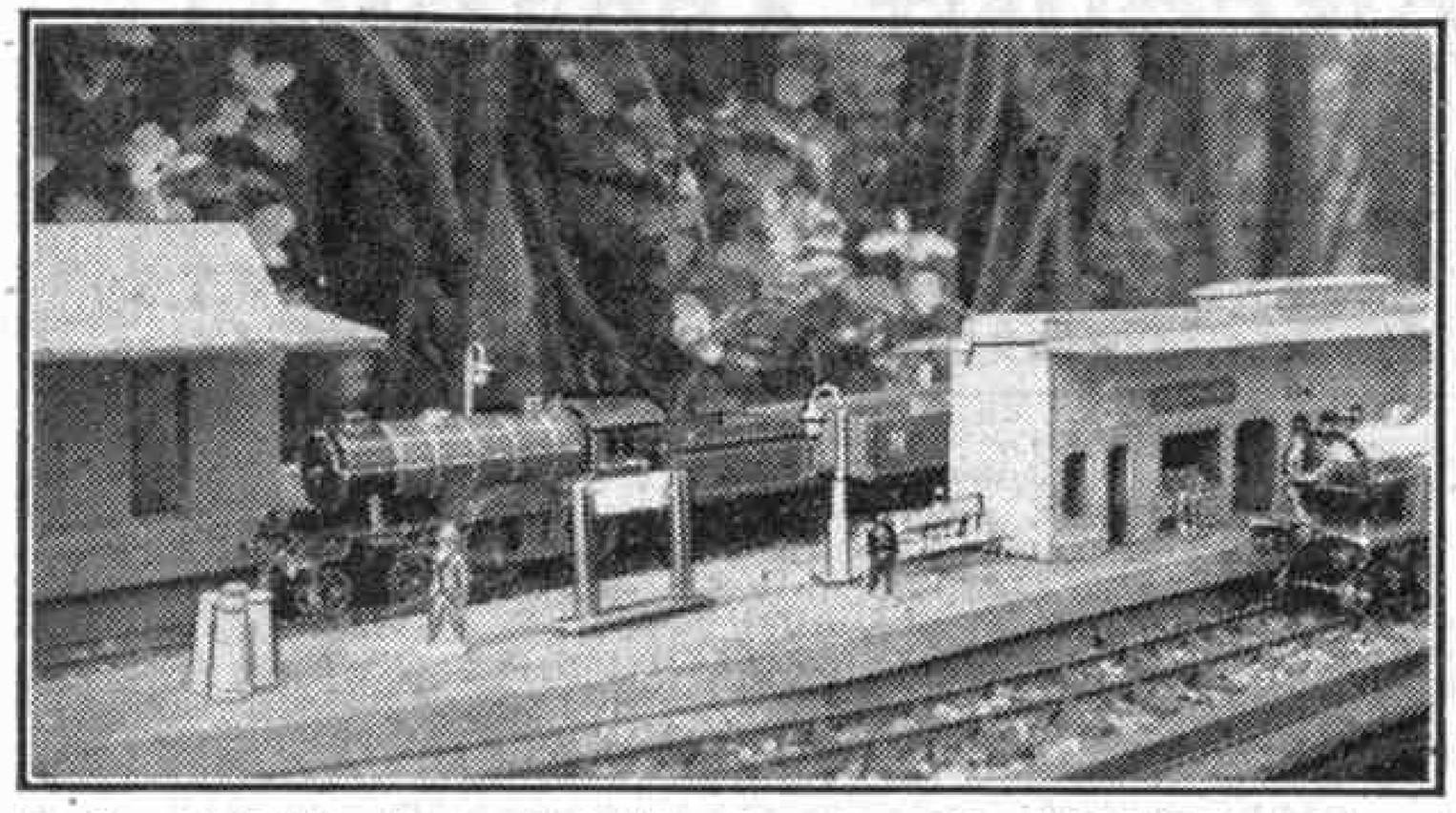


"Clifton," one of the termini of the "Clifton Lines" described in this article. These photographs were supplied by "Rosco," Hexham, the owner of the line.

The line is laid on a raised baseboard structure about 2 ft. above ground level and supported by stout posts driven into the ground. The course followed is slightly winding in order to avoid various trees and similar natural obstacles. This makes it more natural and realistic than a plain straight track would be. The main line run consists of single track owing to the wartime shortage of materials, practically all the track being re-used equipment from the earlier railway. Solid rustless rail is used, laid in cast chairs on wood sleepers, and this appears to stand up to the weather reasonably well. A point of some interest is that at one end of the line the track is run into a garden shed where the engines and trains are kept when not in use. This simplifies the "putting



Another view of "Clifton" showing a main line train approaching. The foundation of the baseboard at this point is worthy of note.



Traffic at "Clifton," showing "The Bramham Moor" L.N.E.R. 4-4-0 and a No. 2 Special Tank.

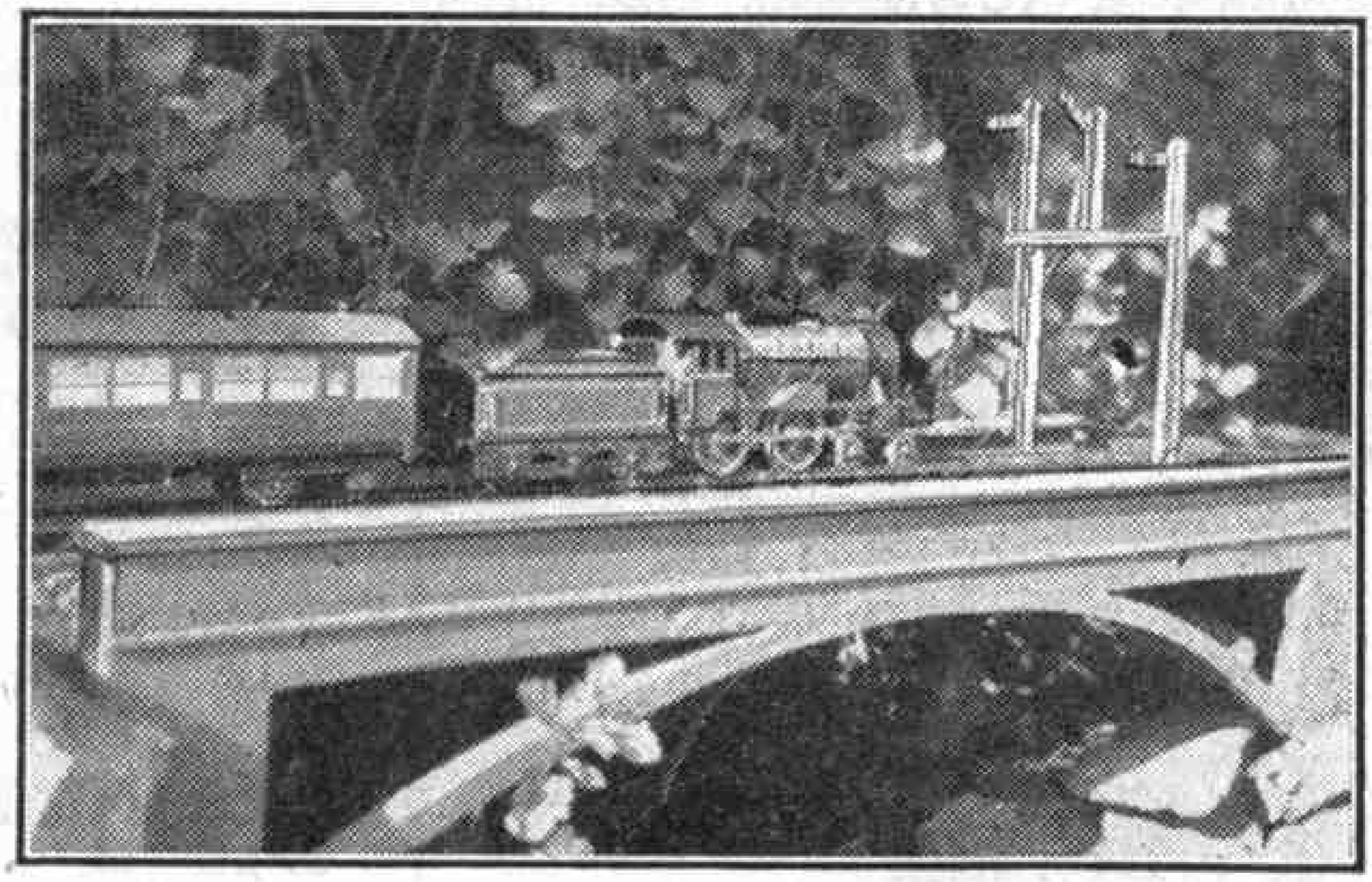
away" part of the business when running ceases; trains are simply run home to the sidings in the shed and left there.

The line runs from "*Clifton*" to "*Eastly*," and there is one intermediate station, named "*Midby*." A point admitted by the "Company" is that, while the terminal stations have always had a good train service, since all trains necessarily had to start or stop at one or the other of them, "*Midby*" for a long time was not so fortunate. It had no train service because the expresses from end to end of the line all careered gaily through its platforms! But at last the "Company" woke up; something would have to be done about "*Midby*"; and something was done.

First the station was cleaned up and electric lighting installed, in order to cheer up the rather dejected locals who had hung about the platforms for so long! Then came the installation of a lever frame controlling the points, for the line is doubled here for crossing purposes; in addition a series of brake and reverse catches was put down at strategic points on the track, these catches also being controlled from the lever frame. They operate in conjunction with the brake and reverse trips on the Hornby clockwork locomotives that are exclusively used on the line. The result is that now a train from either terminus can stop at "*Midby*," the engine can be uncoupled and "run round" in the accepted manner, then recoupled to the other end ready for the return journey. Thus a shuttle service between "*Midby*" and either end of the line is now regularly operated. Colour light signals, which look extremely effective, and the installation of one or two bridges, are other recent improvements.

The illustrations give some idea of the picturesque character of the surroundings. Rocky effects and the use of small plants have helped considerably, while the addition of a "lake" spanned by a girder bridge combines the natural with the engineering interest. The effect of fields at various places has been secured by the laying of fine moss.

Traffic is operated with a fair collection of Hornby and other rolling stock and is in the hands entirely of Hornby clockwork locomotives. These range in age from five to seven years. They still haul remarkable loads with regularity and despatch, and have been found ideal for the work involved on this as on many other systems. They are seven in number, including two No. 1 Special Tender Locomotives for general work, two No. 2 Special Tanks, two No. 3C veterans of the "Flying Scotsman" class, and the newest addition, now nearly five years old, a No. 2 Special L.N.E.R. "*The Bramham Moor*," which appears in two of the illustrations.



Crossing "Clifton Gorge" by means of a concrete type viaduct. The engine is again the L.N.E.R. "Hunt" Class 4-4-0.

For other Stamp Advertisements see also pages 248 and viii.

Stamp Collecting

Bridges on Stamps

By F. Riley, B.Sc.

THERE is a wealth of engineering interest in stamps, and this provides "*M.M.*" readers with splendid opportunities for making special collections that have a double attraction. Of engineering subjects, bridges are among the most popular with stamp designers. There are about 100 different stamps on which a bridge of some kind is shown. In general these are inexpensive and there should be no difficulty in making up a display that will illustrate practically every type of bridge. Readers will enjoy tracking down the stamps and learning as much as possible about them so that they can be written up, a process that will make the collection most attractive if it is done well.

In such a collection as we have in mind, modern bridges will loom largest, for stamp designers naturally try to show off the finest products of their countries, and consequently think in terms of big modern engineering feats. Interesting early bridges can be fairly well illustrated in a bridge stamp collection, however. A good example is the bridge shown on the French Cameroons stamp reproduced at the foot of the page. This is a primitive suspension bridge in which lianas, the flexible stems of climbing and twining plants that grow in abundance in equatorial forests, are used instead of the steel cables that the modern engineer employs. This then is an excellent stamp with which to start the collection, and fortunately it is plentiful, so that readers will have no trouble in obtaining specimens. It has appeared in many colours, from blue, brown and green, and mauve and orange to green and carmine, so here is material for an attractive page or more in the bridge stamp album.

The most primitive form of bridge is a slab of rock or a log rolled into position across a narrow stream, and of this there are no stamp examples. Such a simple bridge would scarcely attract the stamp designer, but in time the type became larger, with pillars or piers in the beds of the wider streams bridged in this way, and so the modern girder bridge with steel spans came into existence. A good example is seen on a Turkish stamp of 1929. It is a railway bridge over the Kizil-Irmak, a river of Asia Minor. Eight different values in various colours were issued in 1929, and five reappeared in the following year with surcharges.

Another early form of bridge was constructed by simply floating logs or primitive boats into position and laying logs or planks across them. This was the ancestor of the pontoon bridge, so much used in warfare, and of the bridge of boats. A stamp showing troops crossing a bridge of this type comes from Rumania. It is the 5 b. value of the issue of 1914, and there was also a higher value, 40 b, in the same series. The age of the idea is seen when it is remembered that the Persians led by Darius crossed the Bosphorus on such a bridge nearly 2,500 years ago, while there is a story of a similar bridge constructed nearly 300 years earlier, in which stuffed skins were used as floats.

The arch bridge may next claim our attention. The arch is usually regarded as a Roman introduction, and the Romans certainly made great use of it in building, while many of their most famous monuments took the form of an arch. So we find Roman arch bridges in those parts of the world over which they ruled, and there are records of these on stamps. Again Rumania provides an example, on a stamp issued in 1933. The bridge is a famous one built at Turnu Severin by the Emperor Trajan, and its arches are seen stretching across the Danube. Other stamps in the same series show the ruins of the bridge, and the Emperor Trajan at the completion of a bridge across the Danube, respectively. In Italy itself, the centre of the Roman Empire, we have another example in the Aqueduct of Claudius, the ruins of which are shown on the 60+30 c. value of an issue of 1926, while for a simple arch we can turn to a 1933 Tripoli stamp.

The modern arch bridge is built of steel, and an outstanding example is Sydney Harbour Bridge, commemorated by an Australian issue of 1932. Most readers probably will be familiar with this handsome stamp, which appeared in three values, 2d., 3d. and 5/–. The 5/– value is to-day catalogued unused at 50/–, so that its inclusion in our collection would be somewhat costly. Fortunately the 2d. and 3d. values have not appreciated in anything like the same proportion.

The modern suspension bridge is not too well illustrated on stamps, which is surprising in view of the magnificent character of the bridges of this type that have been constructed within the last 10 or 20 years, notably across the Hudson River at New York, and across the Golden Gate at San Francisco. The absence of such bridges in the stamp story may be remedied in the coming years, but in the meantime to represent this type we have an interesting suspension bridge in Peru on a 1 c. stamp issued in 1897. The cantilever, the third important type of great modern bridge, is more adequately represented by the Quebec Bridge, seen on the 12 c. Canadian stamp of 1928–29. The span of this bridge is greater than the longest of the Forth Bridge, but the famous Scottish bridge is still the largest cantilever structure in the world.

For other Stamp Advertisements see also pages 246 and viii.

Stamp Gossip
and Notes on New Issues

By F. E. Metcalfe

PERHAPS the most interesting philatelic event of the past month is the appearance of the 1945 edition of Gibbons' British Colonial Catalogue. Of course the stamp market has already discounted many of the rises that are to be found in the new catalogue, but it is pleasing to notice that all the stamps which have been tipped during the past few months have risen sharply in price. Unfortunately our tip for May was crowded out. This was the 1½d. Montserrat, of present reign, perforated 13, and at the time it was only listed at a copper or two; it has now gone up to 5/-. The month previously Barbados No. 249 was mentioned; this has also risen from a few pence to 2/6 mint, and it is still underpriced, even at 30 times face value.

As usual the catalogue shows evidence of careful revision, and while not all will agree with the Editor's opinions as to what shades of stamps of the current reign shall or shall not be listed, or that the old inaccurate system of calling "quarter" perforations "halfs" is in any way a step forward, the plain fact remains that no other catalogue is a patch on "Gibbons." Like it or not, one is forced to use it; yet it is a pity that stamps of the current reign do not receive a better show.

And what about the new stamps? Well, for some time, it has been rather difficult to get hold of new issues, but things should be much easier in future and this month it is a question of what to leave out.

Pride of place must be given to our own Channel Islands. As most readers will know already, during the German occupation both Jersey and Guernsey had their own stamps, and the one that is being illustrated is the top value of a set of six, at present or recently in use in Jersey. These were prepared in Paris, and are pretty crude in workmanship, but their interest cannot be denied, and readers will be wise if they buy a set while they can be bought cheaply. The printing was substantial, but such is the demand for stamps of the current reign that they will all get snapped up in a short time.

Another interesting stamp comes from Luxembourg. It is one of a set of four issued in homage to Great Britain, France, Russia, and the U.S.A., and shows once more to what uses postage stamps can be put by a postal administration which knows that Sir Rowland Hill is dead.

Alas, our own Post Office has not yet learned of this no doubt sad event. It was quite an effort for them to give us a sketchy *postmark* to commemorate one of the great, and for us, joyful landmarks in history. Of course all the work which the preparation of thousands of postmarks entails was a much greater task than the making of a victory stamp; moreover, those who live in small villages, etc., didn't even get a special postmark.

When Monaco stamps were available they were very popular in this country, and no doubt will be so again when they can be imported once more; in the meantime Monaco continues to turn out very attractive issues, one of which we are illustrating. This forms part of an air set of five values, apparently surcharged for some charity, not discernible from the stamps themselves.

France of course is still at it, and the stamp we show this month is a beautiful piece of engraving. It shows a picture of that great actress Sarah Bernhardt. Perhaps a word about French stamps that have been issued during the occupation will not be wasted. Last year France is said to have emitted about 250 new stamps, and the important thing to remember is that in most cases large quantities of each were printed. When the embargo is lifted, supplies arriving in this country should be ample, so there is no need for fancy prices now or then, and collectors will have only themselves to blame if they pay the present "black market" demands. They'll be sorry later.

It wouldn't be the U.S.A. if it didn't provide us with a new stamp.

The one emitted in honour of the San Francisco Conference is a new departure in U.S.A. commemorative stamps. It is of a pleasing blue shade and altogether quite a nice little effort. Incidentally a set of low face value stamps is in preparation in commemoration of that great and good friend of ours, the late President Franklin D. Roosevelt. There is news that Australia also is going to issue a stamp for the same purpose. Let us hope that this is true, for few human beings deserve better of our country than that wonderful American.

And now for our monthly tip. In 1941 the 2d. "Victoria Falls" stamp of Southern Rhodesia, came out for the first time with Perf. 14. There is reason to believe that it has been obsolete thus for some time.

Aircraft versus Seacraft—(*Continued from page 220*)

their Woolworth carriers most useful in the Pacific, and the U.S. Navy has so many of the big carriers that they have been able to use torpedo-bomber-reconnaissance (T.B.R.) deck-flyers to an extent which we have never been able to approach.

In the attacks on the Pacific islands and on Japan these big and little carriers have done splendid work. Without them the U.S. Army could never have begun the campaign which has already won back most of the Philippine Islands and has defeated the Japanese all the way from Australia right up to within bombing distance of Japan itself. From them aircraft have done the preliminary scouting before the landings; they have hammered the beaches with bombs and machine-gun fire to cover the landing of the troops, and they have gone on bombing Japanese positions on the coasts of the bigger islands and all over the smaller islands until landing grounds or strips have been organised near enough for the U.S. Army's big bombers, such as the "Fortresses" and "Liberators," to get to work on the territory which has been invaded.

No praise can be too high for the way in which the U.S. Navy has used its Air Service, or for that Air Service itself. The pilots and mechanics are second to none. The aircraft, in design and construction, are higher up in the scale of international comparison than any other U.S. aircraft. And the crews and aircraft have been used by the senior Naval Officers with an intelligence which could not have been beaten.

Now we are going to see what will happen in the final invasion of Japan. That will be a matter for land-planes. The U.S. Army has been, for some time, using its much boosted "Superfortresses," but the fact is not generally known that a "Superfortress" does not carry so big a load of bombs as does our ordinary standard "Lancaster." It has a longer range, because it has its fuel tanks spread out over its wings where bombs could not be carried. But the new Avro "Lincoln" is better and faster than either.

Those of my readers who have followed the development of aircraft since before the war will remember that for some years Sir Alan Cobham had been developing a method of refuelling aircraft in the air. The aircraft take off with a heavy load of freight or passengers, which they could not lift off the ground along with full tanks, and when in the air are tanked up by fuel-carrying aircraft and so are able to increase their range enormously. The first aircraft of British Overseas Airways which flew from England by Eire and Newfoundland to Canada were thus refuelled over Eire and over Newfoundland.

I suggested two years ago in various newspaper articles that by such means our aircraft, if once established on the coast of China, could reach Japan. No doubt, as we keep the U.S.A. so well informed of all our latest developments, they also have been developing "flight-refuelling," as it is called. And I doubt whether, by the time the invasion of Japan by air starts properly, the Japanese Air Force will be able to hit back any more effectively than the German Air Force has done during 1945.

But in cleaning up all the Japanese who have been marooned on the Pacific Islands and in the Dutch East Indies there will still be plenty for carrier-borne aircraft to do. And good luck to them in the doing of it.

Through a "Superfortress"—(*Cont. from page 223*)

crouch for the last lap—the visit to the exclusive quarters of "tail-end Charlie," the tail gunner.

You pass through the hatch of another bulkhead to get into the tail turret, the third pressurised section of the bomber. There is room to stand erect here and the gunner also has a comfortable seat directly behind the gunsight which controls the weapons in his "tail stinger." There are twin .50 calibre machine guns and a 20 mm. cannon. The thought strikes you that this turret packs a "wallop" rather than a "sting."

When you sit in the tail gunner's seat you get a vague idea of how it feels to be a man who never sees where he is going but always knows where he is coming from.

The tail turret is almost another "greenhouse" like the nose. There are bullet-proof windows in front, above and to the sides. It's lonesome back here in this death-dealing sanctuary. True, the rear gunner can talk with other crew members by telephone but he hardly ever sees one of his fellows during a mission. In fact, he does not even breathe the same air. The tail turret, so far removed from the other pressure sections, and with no pressurised connection with them, has its own pressure system.

After a few minutes in the gunner's chair, to test its comfort, you return to the after compartment and then drop through an entrance hatch to the ground. You're back on earth after a trip through a Boeing B-29 "Superfortress," with a healthy respect for this mighty American bomber and the men who fly in it.

How Saws are Made—(*Continued from page 227*)

operation makes the saw exact in thickness, besides giving it a surface satisfactory for the later polishing operation, if such an operation is considered necessary. The blade is then rigorously examined to make sure that it is of the right thickness, flatness, etc. A little additional hammering may be needed, and accurate cutting to length is carried out after this has been done.

In between grinding and sharpening, the teeth are provided with their correct set. The final tooth sharpening operation is designed to make each tooth a perfect copy of its neighbours, as otherwise the saw will not cut so well. There are some works where the teeth are sharpened by hand filing, but in most factories the work is done by automatic machines employing circular grinding wheels rapidly revolving and composed of specially chosen grits.

When the teeth have been sharpened, the saw is marked, either by etching with acid, or by means of a fly press in which a die cuts under pressure a name or trade mark into the steel, if the saw is capable of carrying such a mark, which depends largely on its width. As a rule fretsaws are too slender for this, but bandsaws are usually marked by one or other of these methods. Sometimes, as a concluding stage in manufacture, the saw may be given a final rolling to stiffen it and give it the greatest possible elasticity.

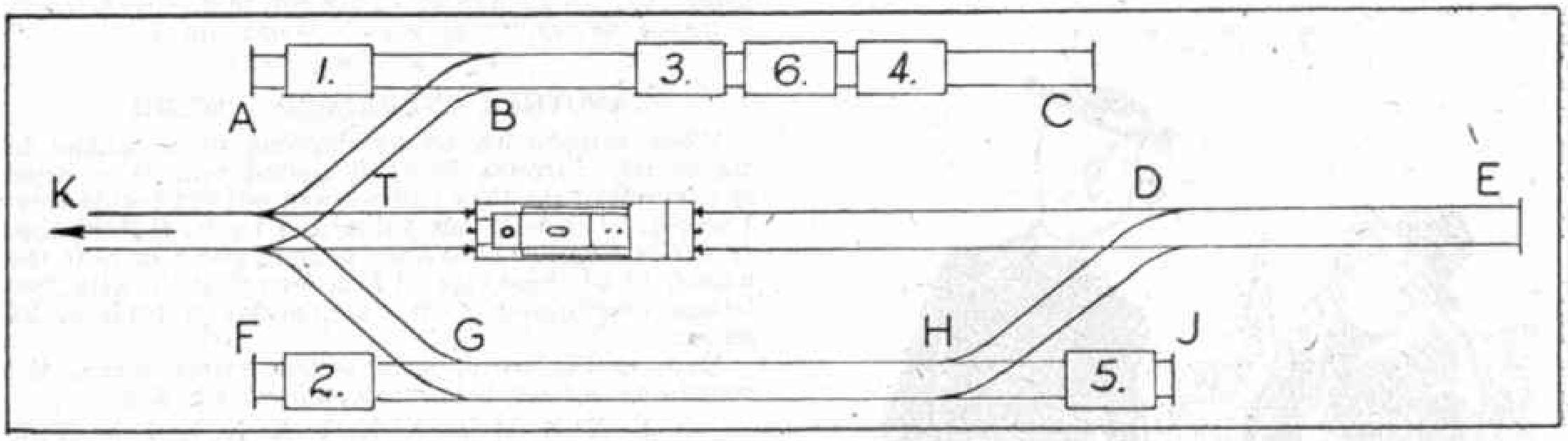
It will be appreciated from what has been written that many delicate and difficult operations go into the making of these apparently simple tools, and this makes it all the more important that any boy using either a handsaw or a fretsaw should be careful to treat it with respect, and not wantonly or carelessly damage it. Saws should not be allowed to rust. Their teeth should be re-sharpened before they have become badly blunted, and the setting of the teeth should be restored if this shows signs of falling off. The teeth should be cleaned after each period of use.

Modern Charcoal-Making—(*Continued from page 235*)

heating! This sounds impossible until one recalls what happens when dry firewood is used at home to light a fire. After the first ignition has started, the wood begins to burn faster and faster. Actually when wood, after drying, is raised in temperature above 180 deg. C. it decomposes spontaneously into charcoal and volatile products. So at the Ford Works wood waste is cut to 8-inch pieces and fed continuously into retorts with insulated sides. A fire is started at the base of the vertical retort when opening up. Wood passes in through a valve at the top, and the whole retort reaches such a temperature that carbonisation continues automatically and yields charcoal through a second "butterfly" valve at the base. Such is the latest example of ingenuity designed to make charcoal more easily, together with wood chemicals for lacquers and "finishes" for motor cars.

Competitions! Open To All Readers

Railway Shunting Puzzle



All "*M.M.*" readers have watched a shunting engine at work. They will have seen how it patiently sorts out the wagons and moves single ones or groups into different sidings for unloading, or perhaps for assembling into a train ready for a journey. In a large goods or marshalling yard, especially a modern one, the track layout is designed for the most straightforward working of this kind. In small yards, particularly those attached to wayside stations, matters may not be so easy. There many an awkward shunting problem has to be solved by the local staff and the crew of the pick-up goods train that arrives to collect local traffic, and to arrange the wagons in order according to their destination.

A simple but fascinating puzzle of this kind is presented to our readers in this month's competition, which is illustrated by the diagram on this page. This represents a main line KE, with a loop line GH, and one siding BC. The wagons are numbered, and the puzzle is to assemble them in correct order along the line KE, with the locomotive in front.

There are some track restrictions. The section AB will accommodate one wagon only, but section BC is long enough for five wagons, or for the locomotive and three wagons. DE can take three wagons, or a locomotive and one wagon; and TD six wagons, or the locomotive and four wagons. FG and HJ will hold only one wagon each, and GH will accommodate four wagons, or the locomotive and two wagons. This line extends indefinitely beyond K.

Entrants in this contest are required to state the consecutive moves that are necessary to assemble the train behind the engine with the wagons in numerical order, that is the locomotive followed by wagons 1, 2, 3, and so on up to 6.

Each entry submitted in this Contest should have the sender's name, full postal address and age clearly written on the back. There will be the usual two Sections, for Home and Overseas competitors respectively, and in each prizes of 21/–, 15/– and 10/6 will be awarded for the best entries in order of merit. A number of consolation prizes also will be awarded. In the case of a tie for any one prize the judges will take into account neatness and novelty of presentation. Entries must be addressed "*July Shunting Puzzle, Meccano Magazine, Binns Road, Liverpool 13.*" The closing dates are 31st August for the Home Section, and 28th February 1946 for the Overseas Section.

Can You Name These Aircraft?

Most of the aircraft generally seen have one or two special outstanding features by which they can be recognised. Sometimes they share one feature with others, but there are always some differences left over that allow the observer to make a decision. We are making this the basis of a competition that we think readers will find interesting and suitable for a holiday month such as July. Below we give a few details of 10 aircraft all of which have been illustrated in the "*M.M.*" Sufficient description is provided to enable each of the 10 aircraft to be named.

1. Four-engined, large single rudder curving into top of fuselage.
2. Single-engined, elliptical wing, rounded or clipped, that is inclined sharply upward towards tips.
3. Twin-engined, twin booms carrying tail, radiators in booms aft of wings.
4. Single-engined, almost square-tipped wing, single fin and rudder unit almost triangular.
5. Twin-engined, mid wing sharply tapered, gun blisters in sides of nose.
6. Single-engined, large wing flaps, tail plane high up on rudder.
7. Four-engined, rectangular twin rudders.
8. Single-engined, triangular fin and rudder unit, radial engine, big round fuselage.
9. Four-engined, tall twin rudders tapering upward.
10. Single-engined, thin wing with straight leading edge and curved trailing edge.

All that readers have to do in this contest is first to decide which aircraft are represented, and then to prepare a list of these and to forward it to "*Aeroplane Recognition Contest, Meccano Magazine, Binns Road, Liverpool 13.*"

As usual there will be two sections, for Home and Overseas readers respectively, and in each prizes of 21/–, 15/– and 10/6 will be awarded to the senders of the three best entries in order of merit. There will be Consolation Prizes also for other praiseworthy efforts. Closing dates: Home Section, 31st August; Overseas Section, 28th February 1946.

July Photographic Contest

This month's photographic contest is the 7th of our 1945 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of the print must be stated exactly what the photograph represents. A fancy title may be added if desired.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed: "*July Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13.*" There will be separate sections for Overseas readers, and in each section prizes of 15/– and 7/6 will be awarded. Closing dates: Home Section, 31st July; Overseas, 31st January 1946.

Fireside Fun

"Swindler is a funny name for a dog, isn't it?"
"Oh, it's good fun. When I shout 'Swindler' to him in the street almost every man about gets scared to death."

* * * *

"Why have I not seen you in church lately, James?"
"I haven't bin, sir!"

* * * *

"Is the teacher very strict with you?"
"Oh, yes, she's a perfect marionette."

* * * *

"I shall publish my poems under the nom-de-plume of 'Smith'."
"What's the idea?"
"Oh, there are a lot of Smiths, you know, and hundreds of men who never wrote a poem in their lives will be suspected immediately."

* * * *

"A strange thing happened to-day. I upset the ink bottle on a clean table cloth and never heard a word of complaint."
"I should have thought there would be an awful row. Why were you so lucky?"
"Well, you see, there was no ink in the bottle."

* * * *

"There is a Black Sea, a Yellow Sea, a Red Sea and a White Sea. Now Smith, point to them on this map of the world."
"I can't, sir. I'm colour blind."

* * * *

"Where's the Master, Phœbe?"
"I ain't seen him since we rolled up the carpet, Mum!"

BRAIN TEASERS

A TOUGH METAL

I am a word of 10 letters, representing a rare metal that is specially valuable in the making of machine tools. Of my 10 letters, numbered 1 to 10, Nos. 3, 4 and 7 make up the name of a caustic liquid, and Nos. 1, 2, 3 and 7 that of a burrowing animal. The word made up of Nos. 10, 2, 8, 7 and 4 means something that we all find good use for, and Nos. 5, 9 and 6 means beginning to grow. What am I?

* * * *

ANOTHER OVERLAPPING WORD

When introducing an overlapping word contest in the April "*Fireside Fun*" I invited readers to send in examples that they had worked out for themselves. The best of these is one submitted by B. Hutchinson. It varies slightly from the example given in that the words, 11 of them, are of four letters each, with two letters overlapping each time, giving a total of 24 letters.

Here is the word, with seven letters given, the remaining letters being represented by X's.

S X X X M X X X T X X X I X X X
A X X X E X X Y

The puzzle is to fit in the missing letters to give a meaningless word made up of 11 four-letter words, the last two letters of each forming the first two letters of the next, apart of course from the last word in the series.

* * * *

"Yonder's the ruin of a castle of the earliest invaders."
"Why didn't those guys build it nearer the station?"

* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

The sentences in our first puzzle should read as follows:

1. The product of 2 and 5 plus 2 is the sum of 2 sixes.
2. The product of 4 and 3 equals the sum of three 2's plus the sum of two 3's.

The word in our second teaser, which when printed reads the same upside down as right way up, is NOON.

The five sentences of our third puzzle are reprinted below, with the letters representing the animal names in capitals.

A timid boy will never BE A Roamer.
Blow your HORN BILL.
Is it right to describe MaC AS SO WARY that he won't answer any question directly?
England is a finE LAND, the home of liberty.
Monkeys eatinG NUts always amuse a crowd.

* * * *

THIS MONTH'S HOWLER

Louis XVI was gelatined.

MECCANO MAGAZINE

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Readers' advertisements are published as soon as possible; inclusion in the first issue after receiving them cannot be guaranteed.

Small Advertisements. 1/8 per line (average seven words to the line), or 20/- per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest net sale figures, will be sent on request.

READERS' SALES AND WANTS

SALES

"Meccano Magazine" Binder; good condition, 4/-.—Payne, "Hillcrest," Westerleigh, Nr. Bristol.

26 "Auto Cars" 1944; 34 "Taxation" 1944; Five "Aero-Modellers" 1944; 23 "Accountants' Journal" 1944; Scale Model, H.M.S. "Bounty," accurate in every detail; 500 Colonial and Foreign Stamps, good condition, many high value, and scarce. Offers to—D. Ward, 189, Baker Street, Enfield, Middlesex.

Lovely Pre-War Toy Farm; over 100 Animals, etc.; also "Film Fun" and "Radio Fun" Annuals, 1940-1944; offers, all perfect.—J. L. Bullock, 14, Greystone Gardens, Kenton, Middlesex.

"Meccano Magazines" Oct. 1929, Aug., Oct.-Dec. 1930, Jan. 1931-Oct. 1941; perfect condition except few copies 1931, slightly torn but repaired. Offers only for whole.—Pitt, 15, Chester Drive, North Harrow, Middlesex.

Arthur Mee's "Children's Encyclopædia," 10 volumes, as new.—Morgan, Bromley's Hill, Churchstoke.

Hornby Gauge "0" Tinplate, Clockwork Straights, 4d. each; Two R.H. Points, 2/6 each; Two R.H. and Two L.H. fitted for Hornby control, 3/- each; also Electric Straights, 6d. each; Two R.H Points and Two L.H. Points Electric, fitted for control, 4/- each; Clockwork Tender Engine, 12/6; Tank, 10/-; also Hornby 6-Lever Frame, Rodding, Guides, Two Traversers. What offers?—Patrick, Howgate, Kilwinning, Ayrshire.

WANTS

Ball Bearing Unit complete, also Geared Roller Bearing Unit complete; high price paid for these in good condition; also wanted Curved Plates and Chain Lengths; replies can also give particulars of any other Meccano parts for Sale.—Lilly, St. Anton, Sandhurst Close, Sanderstead, Surrey.

Meccano No. 2 Clockwork Motor; good condition.—M. Abrams, 54, St. James' Road, Edgbaston, Birmingham.

"Meccano Magazine" March, 1942.—Evans, 12, Buckingham Grove, Timperley, Cheshire.

Dublo, Rails, Tank Loco., etc. Apply—Bidwell, 6, Lordship Road, Cheshunt, Herts.

L.N.E.R. Clockwork "Bramham Moor"; Two Corridor Coaches; One Corridor Brake Coach; Two Luggage (all No. 2); Rails and Points. Price to—D. O'Connor, Ackworth Road, Pontefract.

"Modern Boys"; any dates; must be in good condition.—Edwards, 58, Manor Hill, Birkenhead.

Clean "M.M.'s" Jan.-April 1933; June 1933; Aug.-Dec. 1933; Jan.-March 1934; Sept. 1941; Jan. 1944. Price—Bowen, 55, Lodge Road, West Bromwich.

MECCANO

DINKY TOYS

HORNBY TRAINS

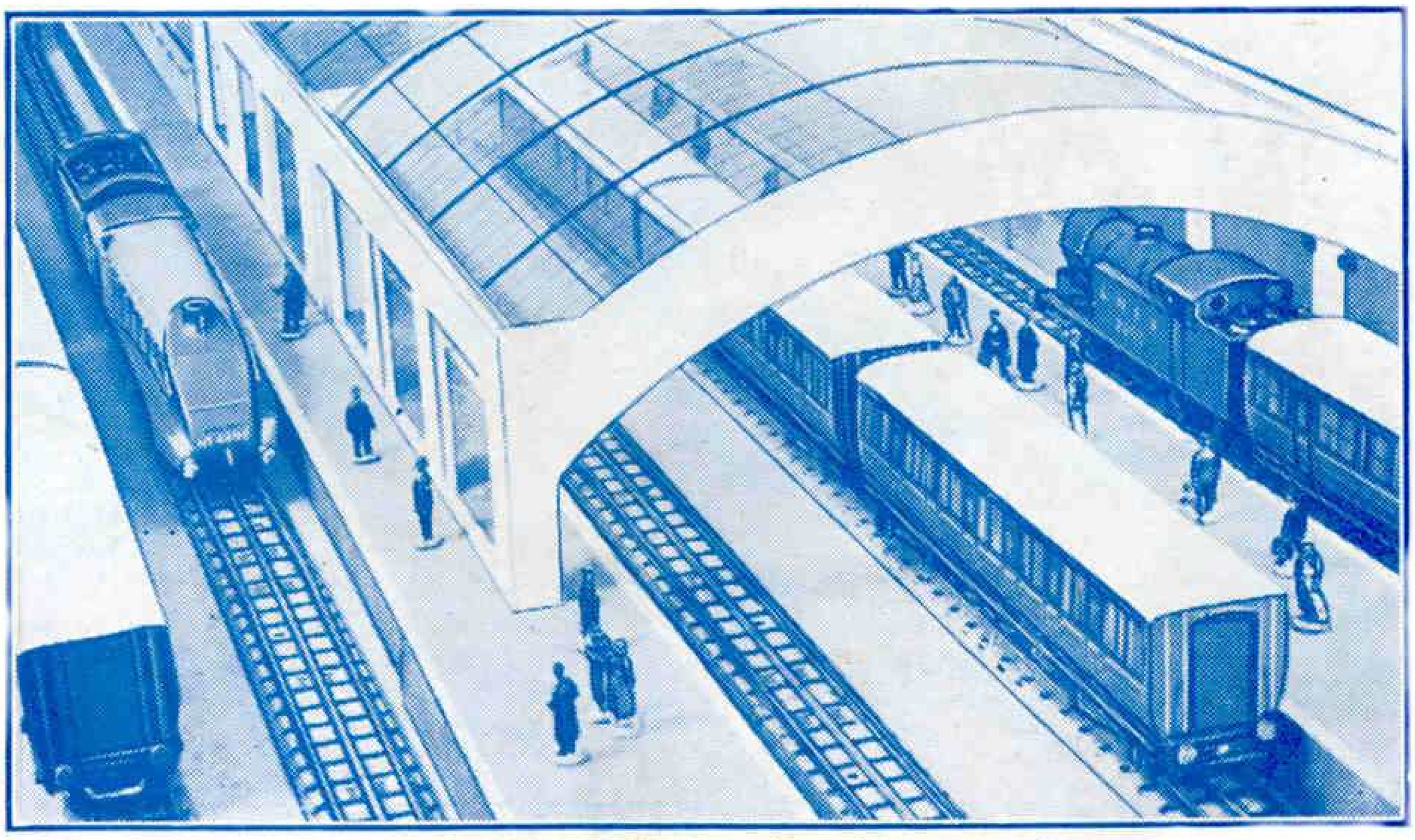
DUBLO TRAINS

VE Day has brought us nearer the time when we shall be able to supply these famous toys.

Our Works, which are still on war production, will change over to our own goods as rapidly as conditions permit—soon, we hope!

So keep looking out for our announcements.

MECCANO LIMITED - BINNS ROAD - LIVERPOOL 13



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